CHNOLOGY DEPARTMENT

Should You Rent or Buy a Plane? PAGE 32

FLYING

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CAN PLANES STOP SUBS?

NAVY DEVELOPS TWO-PLANE TEAMS TO HUNT SUBMARINES

PAGE 13

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IE TRUTH ABOUT "SHOT DOWN" PLANES

PAGE 18

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THE COVER: McDonnell Phantoms (FH-1) fly near Puerto Rico during maneuvers.

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FLYING

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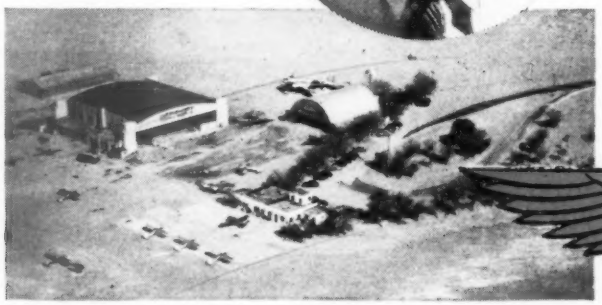

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THE MAIL BOX

FRANCE'S LIGHT JET

. . . The first flight of the Fouga *Cyclone* jet-engined personal airplane ["France's Jet Lightplane," September FLYING] was successful. The plane flew on July 14 at Landes, France.

Pilot was Leon Bourrieau. Take-off was a quick climb steep. The pilot made control tests at various points in the speed range, found all well. The little Turbomeca jet ran with perfect smoothness, causing the pilot to say he had never flown in so vibrationless a personal aircraft. . . .

It looks more than ever as if they have really got something in this machine. No serious snags have yet appeared. The jet is giving all its 200-pound thrust.

OLIVER STEWART

Surrey, England.

MIDGET

Eight years ago, Lester Garbrick of Centre Hall, Pa., built a plane [see photo] for his son Lester, Jr., who was eight years old at the time. Today the plane is too small for the 16-year-old boy,

so his younger brother [Dennis, 7] taxies the plane around the field, as he is too young to fly. The older boy has flown it.

. . . It took Mr. Garbrick one year, spare-time, to build the craft, and he estimates the cost at $50. It was modeled after no particular aircraft, but resembles a Waco. Total weight of the plane is 90 pounds, the engine [an Indian *Scout*] weighing 34 pounds. The plane takes off at 25 to 30 m.p.h., with an estimated cruising speed of 50 m.p.h.

GUYER KELLEY

Milesburg, Pa.

WRONG ROOSEVELT

In "The Bombs Heard Round the World," [August FLYING] you say:

"But Assistant Secretary of the Navy Franklin D. Roosevelt wasn't impressed. 'I once saw a man kill a lion with a .30 calibre rifle,' he remarked, 'but that does not mean that a 30-30 is a lion gun.'"

It was not Franklin D. Roosevelt who made the statement. It was Theodore Roosevelt, Jr., who was Assistant Secretary of the Navy in 1921. . . .

ART RONNIS

Hollywood, Calif.

AIRPLANE PHOTOS

I have a collection of a thousand or more photos of airplanes (mostly military) clipped from various magazines from about 1940 to 1946. Many of the pictures appeared in recognition magazines during the war and were not generally distributed.

I want to dispose of this collection, and wonder if any of your readers would be interested in having them. . . .

EDWARD J. RASER

315 Beechwood Avenue
Trenton, N. J.

RELATIVE TO SHERIDAN

In "Debate on Relativity" [July FLYING] I was amazed to find Hy Sheridan in the company of two very learned, very wise and very wrong college professors.

It should be evident to even the least observing, lop-eared, bolt-brained student that motion through any air mass is always constant, there is no more resistance to flight in one direction or another in an air mass, moving or not. Therefore, airspeed will be constant in any air mass, allowing of course for turbulence which momentarily changes the angle of attack, resulting in fluctuations of the airspeed indicator. . . .

MIKE GREGORY

Buchanan Field, Concord, Calif.

. . . Are Captain Sheridan and the professors trying to kid somebody?

FRANCIS P. McINTIRE

Las Vegas AFB
Las Vegas, Nev.

. . . How can Hy stand behind such a blooper?

JAMES DORAN

Comstock, N. Y.

Put away his pad and pencil,
He has climbed the asylum stair,
Hy Sheridan and his problem
Turned his head and sent him there . . .

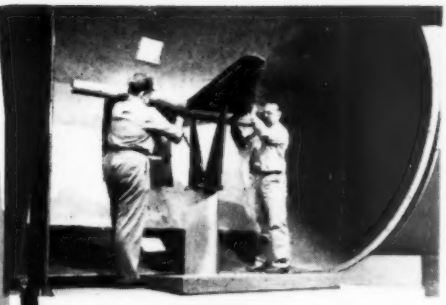
LEO A. PALDANIUS

Port Huron, Mich.

. . . Captain Sheridan is right. . . .

Flying a Taylorcraft from Great Falls to Billings, Mont, one day, I approached Billings Airport from the northwest. Calling the tower, I found the wind from the south, and was given clearance to make a straight-in approach. . . . As I was making the approach, the tower called to say the wind had shifted to the west, and asked that I pull up and go around to runway 25. (*Continued on page* 78)

There's a Big Future for YOU in AERONAUTICAL ENGINEERING —with NORTHROP Training



Aeronautical Engineering offers you a wide choice of creative and practical duties. Here two engineers install a guided missile model in the Northrop Aircraft, Inc. wind tunnel to study its aerodynamic characteristics.

Write your own ticket for earnings and achievement—in *Aeronautical Engineering*. Ride to success on wings of the great *Air Age*. *Aviation* is progressing at "super-sonic" speed. Things to come defy your imagination. Stretching ahead of you can be a lifetime career of fascinating work and rich rewards.

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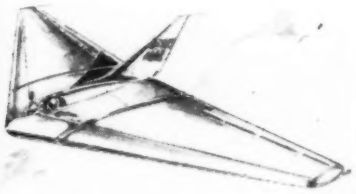
Northrop-trained men have drawn top pay brackets for starting jobs in *Aeronautical Engineering*. They have an enviable record for moving up fast, in both earnings and responsibility. Join them—by getting Northrop training—and gain this important advantage in starting YOUR career. Many types of *creative* duties mean there can be a place for you if you possess *imagination* and *originality*. Many *practical* kinds of work mean there can be a place for you if you like *action* and the *use of skill*.

In a huddle on their design for the rudder of a student project aircraft, these Northrop students study their assembly drawings—a scene they will repeat many times during their careers.

Wing-top classroom—an example of how engineering instruction at Northrop comes vividly to life in an actual aviation industry environment.



All-wing glider designed by Northrop engineering students—a typical training project for practical design and production experience.

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NOTES ON CIVIL FLYING

. . . **Parks College** of Aeronautical Technology of St. Louis University, has announced a course in airport management, perhaps the first of its kind in the United States. The course will lead to a bachelor of science degree in aeronautics from St. Louis University.

. . . **The Piper Clipper** has been approved with Edo Model 1650 floats. The *Clipper* seaplane takes off with a gross weight of 1,738 pounds and is priced at $4,907.18. It will carry four persons of average weight with somewhat reduced gas capacity.

. . . **Until July 30, 1949,** the scheduled airlines of the U. S. had gone 11 months without an accident involving a passenger fatality.

. . . **As of this spring,** there were 2,774 CAA approved schools in operation. Of this number, 1,631 were flight schools only; 1,007 were flight and ground combined, and 136 were ground only.

. . . **Despite reports of airports** closing right and left, the CAA lists 6,431 airports operating on June 1, 1949, as compared with 6,143 on June 1, 1948. Total U. S. civil aircraft decreased from 97,745 to 93,301 during the same period.

. . . **The Australian "Tadpole"** or suction wing is still undergoing flight tests. The wing has made a dozen flights but no official report has yet been issued.

. . . **Resort Airlines** has been granted a five-year temporary certificate to provide all-expense escorted tours between specific points in the United States and points in Mexico, Caribbean area, South America and Canada.

. . . **Fairchild** Engine and Airplane Corporation headquarters will gradually be moved from offices at 30 Rockefeller Plaza, New York City, to Hagerstown, Md.

. . . **Piper Aircraft Corporation** is building 105 *Cub* trainers for the Turkish Air Force. The 65-h.p. planes are similar to the famed *Cub* liaison planes used in the war. (See photo below.)

. . . **Eugene Stiles,** Alameda, Calif., recently set a new world record for model aircraft by flying his gas-powered model in a straight line at 81.587 m.p.h.—15 m.p.h. faster than the old Russian mark.

. . . **A National Mediation Board** Arbitrator's decision has upheld the right of National Airlines to discharge Pilot Maston G. O'Neal, Jr. It was the discharge of O'Neal that precipitated the pilot's strike against National—one of the longest airline strikes in history.

. . . **Paul B. MacCready, Jr.,** 23-year-old Caltech student, again won the national soaring championship in July. MacCready had consistently good performance and made the longest flight of the contest, 205 miles. Dick Comey placed second.

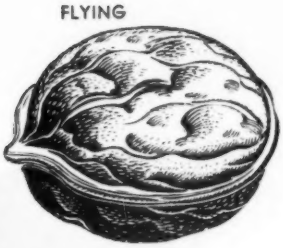
. . . **Missing, One Bonanza.** Andy Anderson, Milwaukee fixed base operator, had Beechcraft *Bonanza* N8549A, Serial No. D1971 stolen from General Mitchell Field on July 26. It was still missing at press time.

. . . **Ryan Aeronautical Company** has reduced the price of the *Navion* $1,000 effective immediately. The new price is $10,985.

. . . **Sealand News** is a mimeographed house organ published by the Sealand Flying Club, Ansonia Airport and Island Airport, Shelton, Conn. The editor, Thomas R. Walsh, does a job that other flying clubs and airport operators could study as a model of how to build goodwill (and incidentally, probably boost flying time).

. . . **Temco** has prepared a new Operator's Handbook and Maintenance Manual for the *Swift-125.* It is being distributed free to owners of Temco *Swifts,* but owners of Globe *Swifts* may obtain copies for $4.

. . . **General Electric Company's** new $25,000,000 jet center at Lynn, Mass., will enable engineers to study jet engines nearly four times as powerful as those now in production.



$40,000,000 NUT

To U.S. airlines, bad weather still makes up a large part of the 'nut' (operating expense). How large a nut? "The commercial airlines, operating about 1,000 aircraft, will lose approximately $40,000,000 (in 1948) due to air traffic congestion, delays, flight cancellations and schedule unreliability."

(Congressional Aviation Policy Board Report, 1948)

Seasonal declines, non-sked competition, low airmail subsidies, and labor costs are often cited as causes of airline deficits. But bad weather is still commercial aviation's costliest problem. Once the Airlines master weather, most of their navigational—and financial—troubles will be over. And GCA is the one navigational aid that masters bad weather.

GCA is airport radar that shows a CAVU picture in all weather of all flight operations within a 30-mile radius of the tower. Each aircraft's position—its distance, altitude and bearing—is clearly and accurately visible on GCA's radar Search Scope. With GCA, tower control now has an even better view of flight operations than tower personnel formerly had on clear weather days.

GCA is the fail-safe solution to the chief operational problems caused by bad weather: holding stacks, landing and takeoff integration, turn-backs and safety-climbs, and rogue aircraft.

Unstacking aircraft in IFR conditions is greatly and safely speeded by GCA. Planes are called out of stacks at 3 mile *space* intervals instead of 10 minute *time* intervals. Traffic congestion is never allowed to develop.

Landings and takeoffs can be closely integrated. With exact knowledge of each aircraft's position, tower GCA can coordinate landings and takeoffs with clear weather speed and safety. Flights now take off and land on time.

Turn-backs and safety-climbs for departing aircraft in IFR weather, another cause of delay and expense, is unnecessary with GCA. Advised by radio of their relative position to other aircraft, departing planes immediately proceed "on course."

When a rogue aircraft threatens, GCA's high-powered Search Scope immediately picks up its position and the tower brings the rogue under control. Thus GCA eliminates danger of collisions and the time-consuming cost of dispersing all other aircraft until the rogue is safely isolated.

In GCA's first winter (1947-1948) of operation at LaGuardia Airport in New York, the following improvements were noted: "During the winter period 1946-47, there were 3,877 scheduled flights cancelled or unable to land... 4,582 delayed... at LaGuardia due to traffic congestion. In the same period one year later (1947-48), there were NO cancellations caused by air traffic congestion... only 555 flights delayed."

"The average time per aircraft delayed at LaGuardia was reduced during the year from 33 minutes to 11 minutes. The airport capacity at LaGuardia was increased from 10 planes in and out per hour in 1947 to 30 per hour in 1948." (ATA)

True, GCA was not the *only* navigation aid at LaGuardia; but GCA was the only *new* navigation aid added in 1948.

GCA's record proves its competence as a fail-safe, reliable navigation aid. It is the Airlines' answer to the costly effects of weather. By seeking an expanded use of GCA, U. S. Airlines can *save* the greater part of that $40,000,000 every year. And they can sell more business than they can handle by consistently offering flights "always on schedule with safety."

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MILITARY NEWS

. . . **Prime objective** of the B-36 is Russia, says Gen. Hoyt Vandenberg, Air Force chief of staff. Russia's belligerent attitude has led Air Force intelligence to make almost daily revision of a list of potential Russian targets. The air arm, says Vandenberg, is prepared to strike with atom bombs on a few hours' notice.

. . . **Jet fighters** will replace all non-jet fighter planes with U.S. Air Forces in Europe. Air combat units on the continent are organized into a single command, the Second Air Division, led by Brig. Gen. Thomas C. Darcy. The new division (with headquarters near Munich—15 minutes by air from the Iron Curtain) has a tactical and interceptor force of approximately 150 fighter planes and 12 to 15 light bombers.

. . . "**Alaska** is defenseless and . . . could be taken tomorrow by a minor-scale airborne invasion," says its governor, Ernest Gruening.

. . . **Dutch aviation** industry is making rapid comeback after wartime destruction by Nazis. Fokker will build 300 Gloster *Meteors* whose Derwent 5 turbojets will be manufactured by the Belgian F.N. factory. Half the *Meteors* will go to Holland, half to Belgium.

. . . **Newest Russ name** for Red airmen is "Stalinist Falcons." About 200,000 flyers in the Red Air Force have been decorated for valor, says Lieut. Gen. Vassili Stalin, the Red dictator's son. Over 2,100 have been given the title of "Hero of the Soviet Union," 61 are "Twice Hero of the Soviet Union," and Alex Pokrynshkin and Ivan Kozhedub are three-time heroes.

. . . **Air Reserve** Association will hold its annual convention October 12-15 at Long Beach, Calif.

. . . **General Electric J-47** turbojets replace Allison J-35 engines used in experimental models of Northrop F-89 twin-jet night fighter and in the Convair B-36D. J-47 has 5,200-pound thrust.

. . . **Air defense of U.S.** does not require enormous expansion of fighter strength, top Air Force generals are said to believe. Instead, a great extension of early warning radar systems should make it possible to use a smaller number of interceptor planes.

. . . **Better than B-36?** Gen. Curtis E. LeMay, chief of Strategic Air Command, says an Air Force plane nearing construction will exceed B-36's performance. Authorities believe he refers to Boeing B-52. The new plane is rumored to be almost as large as the B-36.

. . . **Defense Department** (formerly the National Military Establishment) is the newest executive department, ranking immediately below the State Department.

. . . **Going up.** Prototype of giant Douglas C-124A transport (28 on order) should make first flight in November . . . Prototype Martin XB-51, three-jet light bomber, was slated to make first flight shortly after this issue went to press . . . Bell X-2, rocket-powered research plane designed to explore transonic range between Mach .9 and Mach 2 should fly about the first of the year.

. . . **Newest Thunderjet,** Republic F-84E, has 25 per cent greater thrust than previous models. It is powered by an Allison J-35-17 turbojet (5,000 pounds thrust). Combat radius is increased from 600 to 850 miles, and service ceiling from over 40,000 feet to over 45,000 feet. Fuel tip tanks of the F-84E have aerodynamic fins (see photo) which enable the craft to withstand greater stresses.

. . . **Eight thousand** U.S. airmen are stationed in England today.

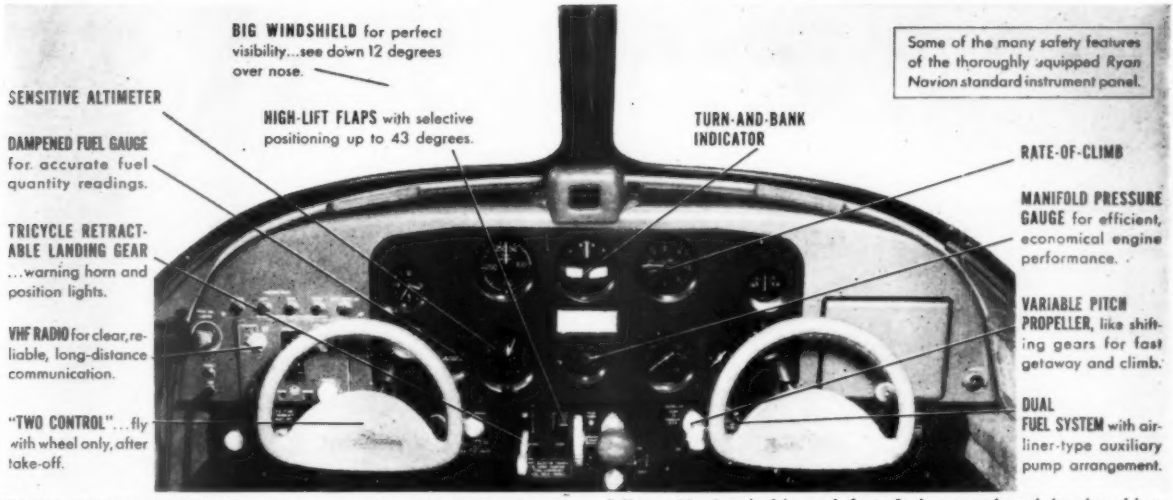
. . . **Group strength** of the Air Force for fiscal 1951 will probably be the same as is proposed for fiscal 1950: 48 groups.

. . . **Air Force** has ordered 337 "slope-line" airport approach lights recently approved as standard for U. S. commercial use by the Army-Navy-Civil Committee. The slopeline system consists of two lines of light forming a funnel and converging at the approach end of a landing runway. Lights are being built by Westinghouse Electric Corporation.

. . . **England's Royal Air Force** had 232,000 men in April, 1949. By March 31, 1950, the RAF strength will probably be reduced by 19,000 to a total manpower of 213,000.

IN A CLASS BY ITSELF FOR SAFETY,

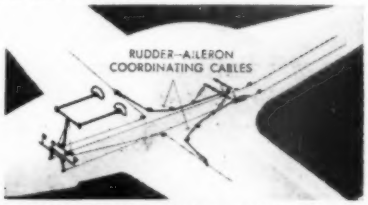
for easy flying, comfort, ruggedness, too!


BIG WINDSHIELD for perfect visibility...see down 12 degrees over nose.
SENSITIVE ALTIMETER
DAMPENED FUEL GAUGE for accurate fuel quantity readings.
TRICYCLE RETRACTABLE LANDING GEAR ...warning horn and position lights.
VHF RADIO for clear, reliable, long-distance communication.
"TWO CONTROL"...fly with wheel only, after take-off.
HIGH-LIFT FLAPS with selective positioning up to 43 degrees.
TURN-AND-BANK INDICATOR
RATE-OF-CLIMB
MANIFOLD PRESSURE GAUGE for efficient, economical engine performance.
VARIABLE PITCH PROPELLER, like shifting gears for fast getaway and climb.
DUAL FUEL SYSTEM with airliner-type auxiliary pump arrangement.
Some of the many safety features of the thoroughly equipped Ryan Navion standard instrument panel.

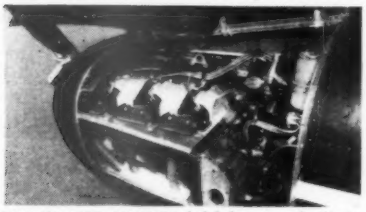
BEHIND THE WHEEL of the *Ryan Navion* is the only place to learn how safe it is, how easy to fly. There's a reason why *Navion* gives you *more* of these vital qualities. Good aircraft design is a blending of desirable features. In the design stage, the dominant features of the plane to be produced are selected . . . all other features follow. *Navion* is big and fast. It is rugged and hardworking. But . . . first and foremost, it is *safe and easy-to-fly*. That's the way it was designed . . . the way it's built. That's why it's first choice with more and more businessmen who fly everywhere. And here's what makes it that way . . .

BIG, FULL-DEFLECTION, high lift flaps deliver landings at only 54 m.p.h. with full load and no wind. Only 875 ft. needed to clear a 50-ft. obstacle—landing or take-off.

RUGGED, WIDE TREAD tricycle gear features oversize tires and steerable nosewheel. Deep-stroke shocks and equalized hydraulic brakes make ground-handling easy.



INTERCONNECTED RUDDER AND AILERON give you "two-control after take-off," yet you have rudder when you want it. *Navion* forgives pilot errors short of foolhardiness.



900-FT. PER MINUTE initial rate of climb is delivered by *Navion's* husky 205 h.p. engine. Dependable *dual fuel system*, like modern airliner's, is standard equipment.

FULL AILERON control *under* stalling speeds, with *Ryan Navion!* Rugged, stall-resistant, all-metal wings are "built like a bridge" . . . and that means real safety for *you!*

SMOOTH, "IN A GROOVE" flying even in rough air . . . cruising speeds up to 155 m.p.h. *Navion* delivers 800-mile economy range with auxiliary underseat fuel tank installed.

NEW PRICE $1000.00 LESS!

NO OTHER PLANE COMBINES SO MANY FEATURES SO WELL

THESE COMFORT FEATURES ARE STANDARD EQUIPMENT

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Ryan Navion

Rely on Ryan

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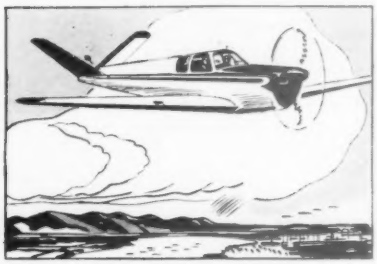
Here are just a FEW of the reasons why this

Beechcraft

BONANZA is a better buy!

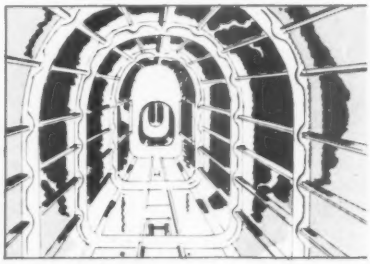
Ruggedness plus Speed . . . Performance plus Economy . . . Beauty plus Power

The Beechcraft Bonanza's high payload, high speed, and low operating cost, combined with extra safety and greater comfort, make this Beechcraft a better buy! It's easy to enter or leave the 4-place Beechcraft Bonanza with its unique retractable step and wide auto-type door. Plenty of room for four big people to ride in uncrowded comfort. Maximum 5-way visibility and sound-proofing of the smartly appointed cabin add to the limousine luxury of this outstanding airplane.



High Performance—At 8000 feet the Beechcraft Bonanza cruises at 170 mph using only 56% of the engine's maximum rated take-off power. *No engine overload*, so you get extra speed with an extra margin of safety. Take a look at the Beechcraft list of guaranteed performance figures for the Bonanza.

...Plus Economy—Because of lack of engine overload you get lower maintenance costs and longer service life. Beechcraft Bonanza travel means you get an *extra low* per mile operating cost, an *extra low* fuel consumption of 9½ gallons per hour at cruising speed. You *save*, with a Beechcraft Bonanza.



...Plus Safety—Extra ruggedness of the sturdy framework means an extra margin of safety. Rated in the *utility* category at *full gross weight*, with a limit flight load factor of 4.4 G's, the Beechcraft A35 Bonanza has been subjected to dive tests by radio control at 275 miles per hour and pulled out safely at 3 G's.

Compare these performance features	Compare these comfort features
Top speed, 184 mph	Exclusive retractable step
Cruising speed, 170 mph	Limousine entrance
Range, 750 miles	Insulated, sound-proofed cabin
Service Ceiling, 17,100 feet	Quickly removable rear seat
Fuel economy, 9½ gal. per hour	Luggage compartment accessible two ways

These are only a few of the reasons why the Beechcraft Bonanza is a better buy! *See* it today! A note on your company letterhead will bring illustrated brochures describing the Beechcraft Bonanza's many *extra* advantages. Write to Beech Aircraft Corporation, Wichita, Kansas, U.S.A.

Beechcraft

BONANZA MODEL A35

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

A lethal pair, these two Grumman Guardians (XTB3F's) work as a team on anti-sub patrol. One plane (foreground) has radar equipment to detect subs, the other carries depth charges.

FLYING
VOLUME 45 NUMBER 4
OCTOBER • 1949

Navy develops secret tactics to battle the dreaded snorkel submarine.

Can Planes Stop Subs?

By Lieut. Comdr. W. JACK BUTLER

IN THE INTERNATIONAL armament picture, submarines are the question mark. If the United States were to be drawn into another war, these lethal weapons would be a primary target of the Navy and one which, oddly enough, would be fought mostly from the air.

The new, deep-diving snorkel submarines defy even the best detection devices known today. They are able to sustain themselves at sea for months. In the past few years their underwater speeds have doubled. Their hulls have been strengthened. They have been made even more terrible by the German-invented acoustic homing torpedoes.

Here's how the Navy would meet the menace. Carrier task forces capable of speeds which leave subs panting for breath would move in to blast enemy ports where subs hang out. The new type submarines must be stopped as early as possible. Hard-hitting tactical planes are needed for this work—planes like North American's new AJ. It takes bulls-eye hits by fast maneuverable bombers to destroy massive concrete submarine pens and

underground assembly yards. Even atomic bombs wouldn't be very effective unless dropped directly upon the targets. Best planes for the job are dive bombers, fighters carrying giant rockets, and jet-powered medium attack bombers. They can make their runs at tremendous speeds, let go with precision, and get away in a hurry.

Mining enemy harbors and water approaches will play a bigger part in these operations than ever before. Large bombers will be flown in almost at wave-top level to sprinkle thousands of mines equipped with magnetic fuses that blow up when subs get near. Surface craft, too, will carefully mine all but narrow passageways to U. S. harbors. With mines getting more and more touchy as scientists keep tinkering, subs will find it awkward and hazardous to operate effectively at close range.

Toughest part of the job will be knocking out those submarines already ranging the seas. During the opening weeks of a war this will require all the personnel and equipment that the Navy can lay its hands on. Land-based bombers, big seaplanes and airships will maintain constant patrol over coastal waters in order to keep subs away from U. S. shores. Escort carriers, each sprouting nearly a hundred long-range single-engined planes, and faithful destroyers with big powerful depth bombs, will form protective screens around merchant ship convoys bound to and from allied countries. Taking the offensive will be hard-hitting, aggressive Hunter Killer forces. Utilizing the most powerful features of the destroyer, the *Jeep* carrier with its radar-equipped planes, and a new weapon—the anti-sub submarine—these forces will roam the seas on their own to track down and destroy units of the enemy's underwater fleet.

The whole job will place a premium on super-sensitive detection devices and skilled men to operate them. And one of the Navy's biggest tasks is to extend ranges at which subs can be discovered.

This fight between offensive and defensive forces of submarine warfare is two wars old now. Its story proves that subs can be whipped if enough ingenuity and effort are expended.

First round of this fight began on a hot summer's day in 1914 when one of the Kaiser's new U-boats blasted three mighty British cruisers to kingdom come. The world was aghast. How could this terrible weapon be stopped? From that day forward, nations aspiring to control the seas have been trying to develop methods and equipment that would check this deadly destroyer of merchant ships and vital supply lines.

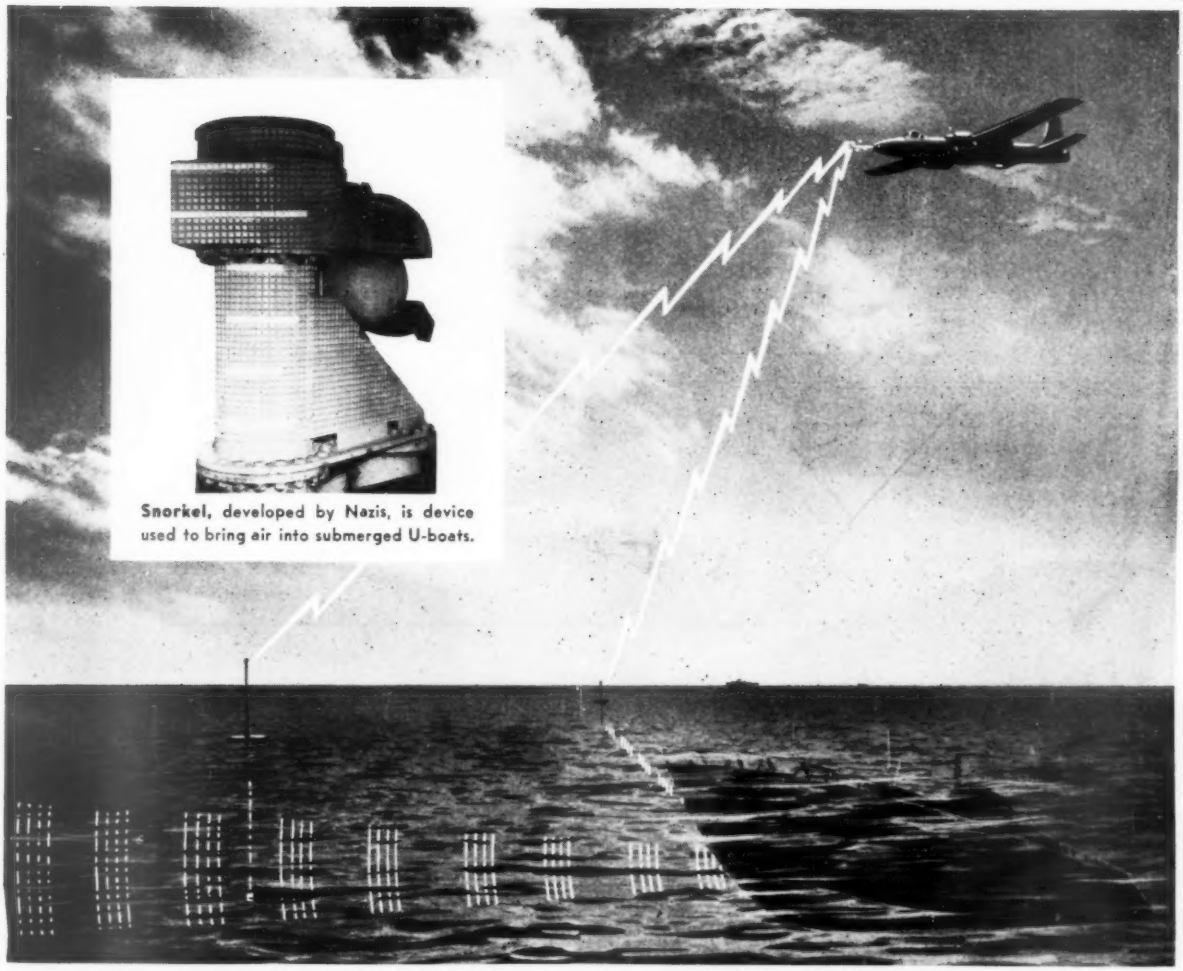
Most dreaded enemy of the submarine has been the airplane. During the early months of World War I, Navy planners were slow to exploit its potentialities. But as the war progressed and successes piled up, small seaplanes and landbased bombers were used more and more to patrol European coastal waters. Toward the war's close, our Navy was operating 27 air stations in seacoast towns of France, Ireland, Italy and England. British Admiral Jellicoe said, "To date there has been no case of a vessel being attacked by an enemy submarine when aircraft has been present . . ."

Thus the U-boats were forced to concede a point to the airplane. It wasn't that subs were having any great trouble in keeping Davy Jones' locker filled, but that they were being compelled to develop a new set of tactics in order to avoid airplanes. At the time, these tactics seemed redoubtable. The subs were removed from coastal waters and sent to operating on the high seas beyond the range of landbased air. Attacking at night or during bad weather when planes stayed on the roost became a favorite habit. German sub captains were ordered to dive immediately upon sighting planes. This left the old 60-knot crates of those days unable to close fast enough to make successful counter-attacks.

After the Armistice, naval air planners sought vainly for some defensive solution to these new U-boat methods. They knew that in another war submarines would be out in force. Licking the problem took years of scientific development, the threat of defeat in 1942, a cool $100 billion of hard cash, and the combined efforts of 1⅓ million men.

When the showdown came, late in 1942 and early in 1943, during the climactic phase of the Battle of the Atlantic, Allied ships were being sunk in ghastly numbers. The shipyard slogan: "We can build 'em faster than they can sink 'em" was calculated heroics (*Continued on page* 69)

Modified Navy Constellation has more radar equipment than you can shake a stick at. It is being used to test advanced anti-sub equipment and other electronic systems for installation on warplanes. Radar is in top and bottom humps and elongated nose.



Snorkel, developed by Nazis, is device used to bring air into submerged U-boats.

Sonar (word coined from abbreviations for sound, navigation and ranging) would play important role in defense against subs. When sound waves strike "listening" equipment (dropped in water by plane) radio signals are transmitted, enabling plane to plot sub's location.

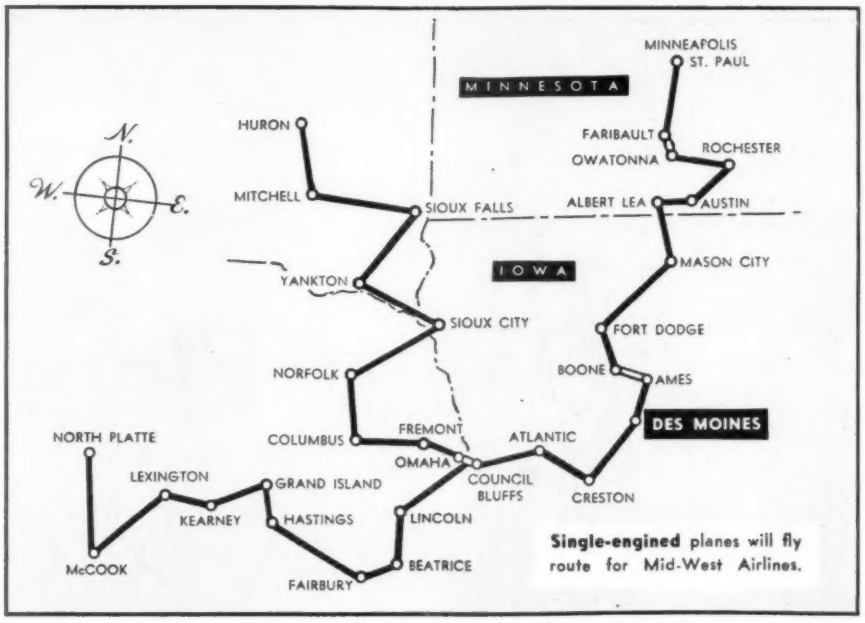
Jet-powered patrol plane, the 40-ton Martin Mercator (XP4M-1) has two conventional Pratt & Whitney Wasp Major power plants plus two Allison J-33 jet engines. Equipped with advanced electronic devices, the XP4M-1 is designed especially for anti-submarine warfare.

F. C. Anderson, president of Mid-West Airlines, is activating scheduled feeder net with single-engined planes.

THE LIGHTPLANE AIRLINES

By JOHN T. DODSON

CAB's approval of single-engined planes for scheduled operations gives feeder airlines a new lease on life.



SINGLE-ENGINED AIRPLANES, which started the airlines going before multi-engined equipment was developed, are about to return to scheduled service. The CAB gave its approval for the use of single-engined planes and small nontransport-type multi-engined aircraft under specific limitations early in June. Operations are limited to Visible Flight Rule conditions, to topography favorable to single-engined operation and to relatively short trips.

The result of the new regulation is to open a whole new market to lightplane manufacturers. It provides operations to rural areas which could never otherwise receive scheduled airline service. It also will help bail out many feederlines which never have started operations, or are operating at losses because economical small twin-engined airliners were not available.

The outlook for the single-engined planes is made even brighter by the intention of the Post Office Department to establish aerial star routes. At present there is only one such route in operation, but the Postal authorities are sponsoring legislation to obtain others.

Two feederlines are about to start operation with single-engined equipment. They are Central Airlines, Oklahoma City, which will fly Beech *Bonanzas* over its 1,335-mile system in Oklahoma, northern Texas and southern Kansas, and Mid-West Airlines which will fly Cessna 190's over 1,238 miles in Minnesota, Iowa, Nebraska and South Dakota (see map).

Mid-West Airlines has purchased seven Cessna 190's and will fly two round trips per day over each of the three segments of its route. Six of the planes will be in daily use with one as a spare. Total distance flown per day thus will be 5,132 air miles. The CAB certificate to Mid-West grants it authority to carry mail, passengers and cargo. Passenger fares have not yet been decided upon but F. C. Anderson, company president, says they will be low enough to meet the competition of buses and private automobiles when operations start shortly after October 1.

"One main reason we did not activate our route months ago is that over one-third of the towns to which we are to furnish service do not have an airport of sufficient size to accommodate a DC-3 or similar available multi-engined equipment," Anderson says.

"Throughout many portions of the country, particularly in the Middle West, the topography is such that modern single-engined airplanes can operate just as safely on a daylight VFR basis as multi-engined equipment. It is my sincere belief that this most recent forward-thinking action of the Civil Aeronautics Board in permitting this new type of operation is a forerunner of a complete network of feeder and star routes that will blanket the country where the terrain is such that this type of operation can be safely conducted."

Mid-West will offer service to 32 towns on its 1,238-mile route. The Cessna 190's it will fly are five-place all-metal aircraft which will carry a pilot, four passengers, and about 200 pounds of mail or baggage.

Central Airlines will fly eight Beech *Bonanzas* on its feederline system. Plans are to fly two round trips daily over each route segment of the line's system, serving 25 major cities. Central Airlines Route 1 will be from Fort Worth-Dallas to Oklahoma City with intermediate stops; Route 2 will be between Oklahoma City and Wichita; Route 3 will be between Fort Worth-Dallas and Tulsa; Route 4 will be Tulsa to Amarillo, and Route 5 will be Fort Worth-Dallas to Texarkana. All will have intermediate stops. Operations headquarters for the airline will be at Fort Worth.

The CAB's approval of single-engined airplanes for scheduled airline use is a tribute to the dependability and safety of American executive type aircraft. It is, moreover, smart business. Feederline operating costs last year were 75 to 80 cents per mile for DC-3's and Beech D-18C's. Such high costs are not justified by passenger load factors which have averaged only about five passengers per plane mile. Nor have they been justified by air mail carried. CAB says that the average feederline mail load earlier this year was less than 50 pounds. The single-engined planes are expected to operate for from 25 to 30 cents per plane mile, of which only 10 to 15 cents will be direct flying costs. Flying the single-engined planes with only a single pilot also will (*Continued on page* 76)

Nazi records show "kills" claimed by Eighth Air Force were grossly exaggerated.

THE TRUTH ABOUT "Shot Down" Planes

ERRONEOUS AAF CLAIMS AFFECTED INTELLIGENCE DATA

The heavy Nazi fighter losses which our newspaper headlines shouted in the early months of World War II were seriously inflated. The facts presented here are excerpted from or based upon the new book, "The Army Air Forces in World War II, Volume Two. Europe: Torch to Point-blank, August, 1942 to December, 1943." Prepared under the editorship of Wesley Frank Craven and James Lea Cate and published by the University of Chicago Press. Price is $6.

THE AIR OVER ENGLAND vibrated with the thunder of forming bombers. October 9, 1942, was to be memorable for several reasons. It was to witness the first American bombing mission against occupied territory to be conducted on a really adequate scale, with 115 bombers participating. And although the *Flying Fortress* had already made 13 appearances over enemy territory, this was to be the first time the German high command saw fit to mention its activities publicly.

The bombers formed up and set off across the English Channel with a combined British and U. S. fighter escort of 156 aircraft including 36 P-38's. The primary target was the steel, engineering, locomotive and freight car works at Lille, France.

Bombing results were less accurate than on previous missions. At least two of the groups were inexperienced and, in addition, despite the fighter cover, the Germans pressed home fierce fighter attacks. The German Me-109's and FW-190's practically ignored the fighter escort in their concentration on the bombers. Three *Fortresses* and one *Liberator* failed to return from Lille, although the crew of one *Fortress* was picked up at sea. Four *Fortresses* suffered serious damage, and 42 other bombers were slightly damaged.

Now what was the German loss and how did it compare with the American? On this large mission, the first of its kind and one on which the German fighters attacked with unusual resolution, the answer was vital to Allied intelligence and plans.

As the bombers landed, the wounded were eased carefully into waiting ambulances and the rest of the crews were sent to interrogation by young officers from the intelligence school at Harrisburg, Pa.

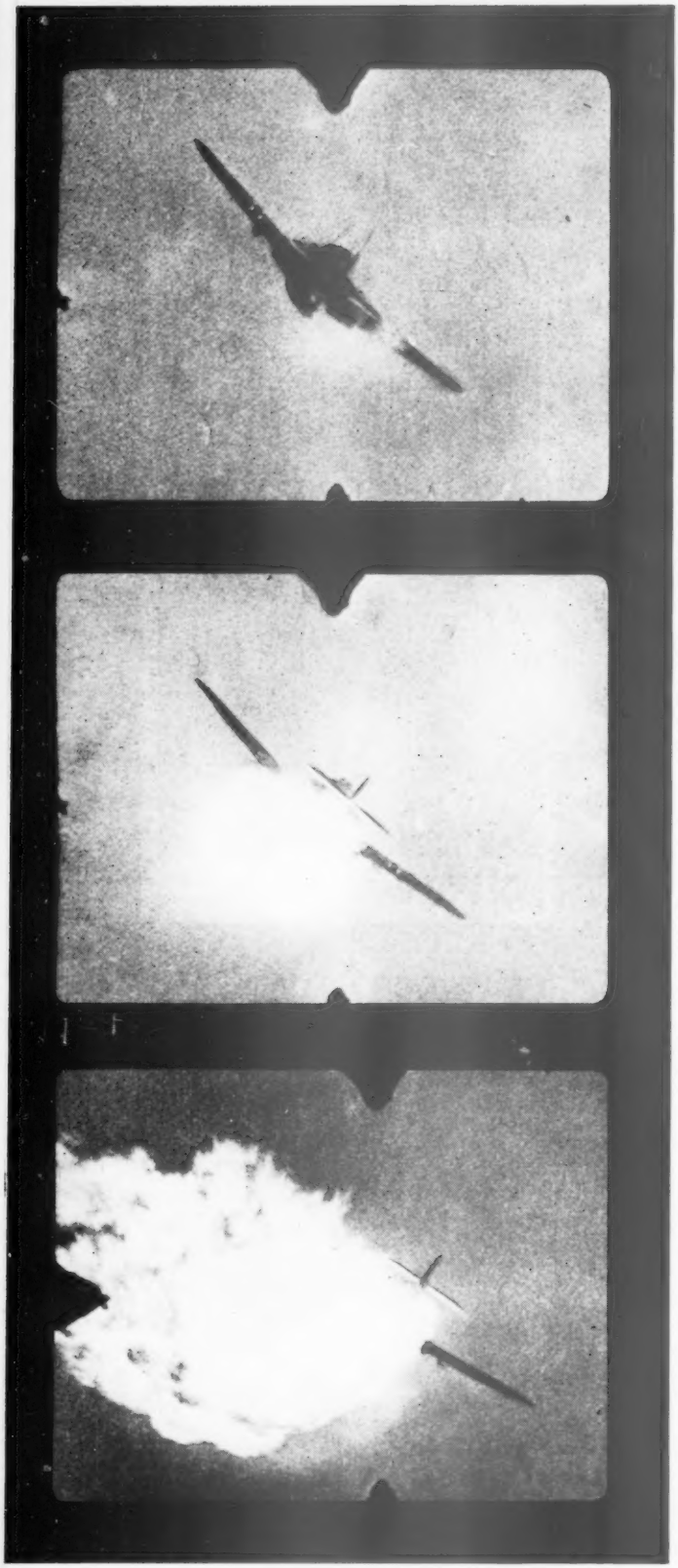
When the preliminary figures were compiled there was jubilation in the 8th Bomber Command. The initial figures indicated that the American bombers had destroyed 56 fighters, probably destroyed 26, and damaged 20. Thus the *Fortresses* and a few *Liberators* had put out of action 102 enemy fighter planes—more than 15 per cent of the estimated German Air Force fighter strength in western Europe.

But wait. There were other factors to be considered. British intelligence believed that not more than 60 enemy aircraft could possibly have intercepted. This discrepancy called for a re-estimate. By October 24, the Lille claims had been "scaled down" to 25 destroyed but with a listing of 38 probables and 44 damaged. The grand total of 107 was even higher than the original figure.

In January, 1943, a general review of early combat reports reduced the figures for this engagement to 21 destroyed, 21 probably destroyed, and 15 damaged. This was still a total of 57. Even these more conservative figures did little to change the earlier conclusion that the Lille mission offered convincing evidence that the day

Destroyed Nazi Me-109G burns before crash. It exploded on impact, the kill substantiated by photos.

Cost was high. A Flying Fortress, its tail shot off, ends its final mission over Holland.



"Kill" is confirmed by camera in U.S. plane as Me-109 is tailed (top), set afire (center) and destroyed (bottom). But captured records show that many reported "kills" actually were not damaged.

bombers "in strong formation can be employed effectively and successfully without fighter support."

This conclusion was substantially wrong. The information on "shot down" planes on which it was based has now been shown to have been almost wholly wrong.

The official German reports, which have been translated since the war, indicate that *only one German fighter was destroyed in the Lille action and none was damaged. One other fighter lost that day could possibly be credited to the effects of combat with American planes. In short, the maximum possible score was two, not 102 or 57.*

The Lille mission was only one of many flown by American bomber forces in which the reports of enemy fighter losses were similarly in error, although not to such a large extent. The results of the mistaken reports were to give American commanders a wholly erroneous view of the strength of the German Air Force at various times, and of the status of the German aircraft industry.

On December 20, 1942, the 8th Air Force dispatched 101 bombers against the aircraft part and repair depot at Romilly-su-Seine. This was the deepest penetration yet made of enemy-occupied territory, and the attacking force made contact with almost the entire force of enemy fighters located in northeastern France. The American bombers were escorted part way by short-range *Spitfires,* and as soon as they turned back, 60 German fighters came boring in. These fighters were later relieved by another force of 50 to 60 fresh fighters. The attacks continued almost to the target and resumed on the return trip. The Americans lost six bombers, two others were so badly shot up they crash-landed in England, and 29 more were damaged.

Interrogation of the returning crews indicated that seven enemy planes had been seen to crash, that 18 broke up in mid-air, and that 27 more went down in flames. Total claims originally registered included 53 destroyed, 13 probably destroyed, and eight damaged. These claims seemed to be excessive in view of the fact that not more than 120 aircraft were estimated to have attacked the American bombers.

The British issued a report suggesting that probably 30 fighters had been destroyed and 15 to 20 damaged. Subsequently, the 8th Bomber Command lowered even this figure, and on January 5 suggested 21 fighters had been destroyed, 31 probably destroyed, and seven damaged.

Yet the official German records suggest that the Americans shot down only two planes and damaged a third. Three other enemy fighters lost that day could be indirectly credited to the American mission, as also 10 fighters listed as damaged for reasons not directly attributable to "enemy" action (such as planes involved in accidents as a result of exhausted fuel supplies after combat).

In the Bremen mission of April 17, 1943, 117 *Fortresses* of the First Bombardment Wing were dispatched, and 107 were attacked. The force sustained a record loss of 16 aircraft shot down and 46 damaged. The returning bombers made claims for 62 fighters destroyed, 15 probably destroyed, and 17 damaged. German figures, however, show total losses for the day, exclusive of those obviously not connected with the U. S. attack, of five fighters destroyed and five damaged as a result of "enemy action," and three fighters destroyed and four damaged for reasons not attributed to "enemy action."

On May 14, 1943, the 8th sent 126 bombers against Kiel, the most distant target yet attempted—at a radius of some 460 miles. The German defenses evidently were taken by surprise, and only a few of the anti-aircraft guns known to have been available there were operating. Nor were fighter attacks, although (*Continued on page* 73)

HOW TO FLY IN THUNDERSTORMS

Pilots can't fly over thunderstorms, but in pressurized planes they can fly between saddlebacks and avoid them.

Here's latest data on one of flying's greatest hazards, gathered by airmen who have flown in hundreds of storms.

THUNDERSTORMS have always been and always will be dangerous places for airplanes to be. For private pilots in lightplanes they are suicide. Even the most experienced instrument pilots in fully instrumented airliners never fly through them unless there's no way around.

Until the past year or so, the thunderstorm was doubly feared because it was unknown and not understood. Today that part of the fear of thunderstorms can be dispelled. They are no longer unknown. The Thunderstorm Project in the past four years has studied the mechanics of thunderstorms scientifically. It has flown carefully instrumented research planes (Northrop *Black Widows*—P-61C's) through all levels of thunderstorms hundreds of times. It has analyzed the data carefully.

This research has dispelled the mystery of thunderstorms as far as meteorologists are concerned. Now the investigations into the anatomy of storms not only provides pilots with an understanding of what makes them tick, but tells how to fly in them.

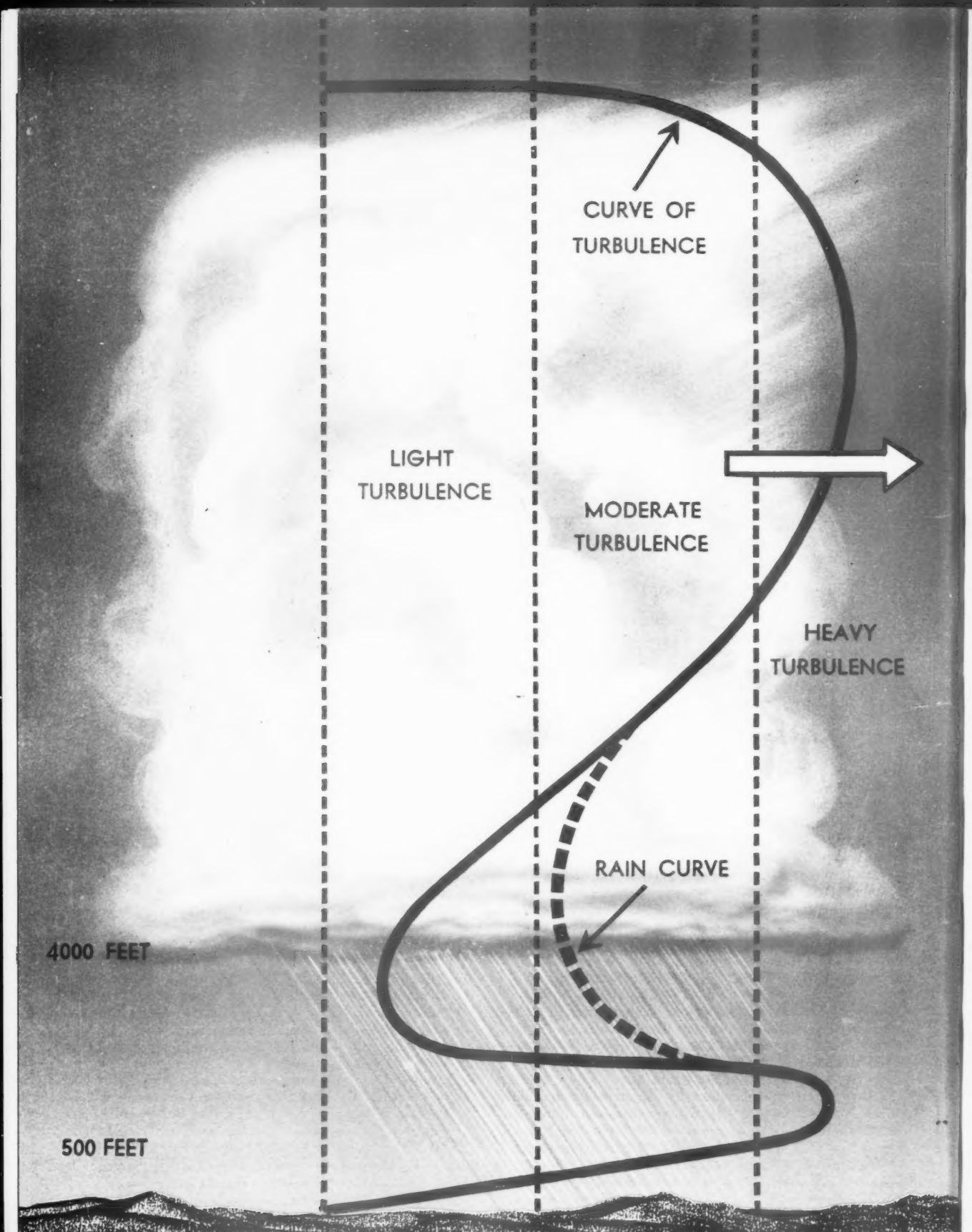
The Thunderstorm Project is a research group of the U. S. Air Force, U. S. Navy, National Advisory Committee for Aeronautics, U. S. Weather Bureau, and several other contracting agencies under the direction of Dr. Horace R. Byers of the University of Chicago. Roscoe Braham is official in charge of the Project. The Project conducted its investigations during the spring and summer of 1946 near Orlando, Fla., and during the spring and summer of 1947 near Wilmington, O. The compilation and charting of the data gathered is just now being developed to the point where positive advice can be given to pilots on how to fly in thunderstorms. This is the first article written for any aviation magazine on the subject.

A previous article in FLYING ("Who's Afraid of Thunderstorms?" by Curtis Fuller, July, 1947) described the structure of thunderstorms based upon analysis of the Florida research only. A recap of some of this information is advisable so that pilots can understand the reasons for some of the rules for flying thunderstorms to be presented here.

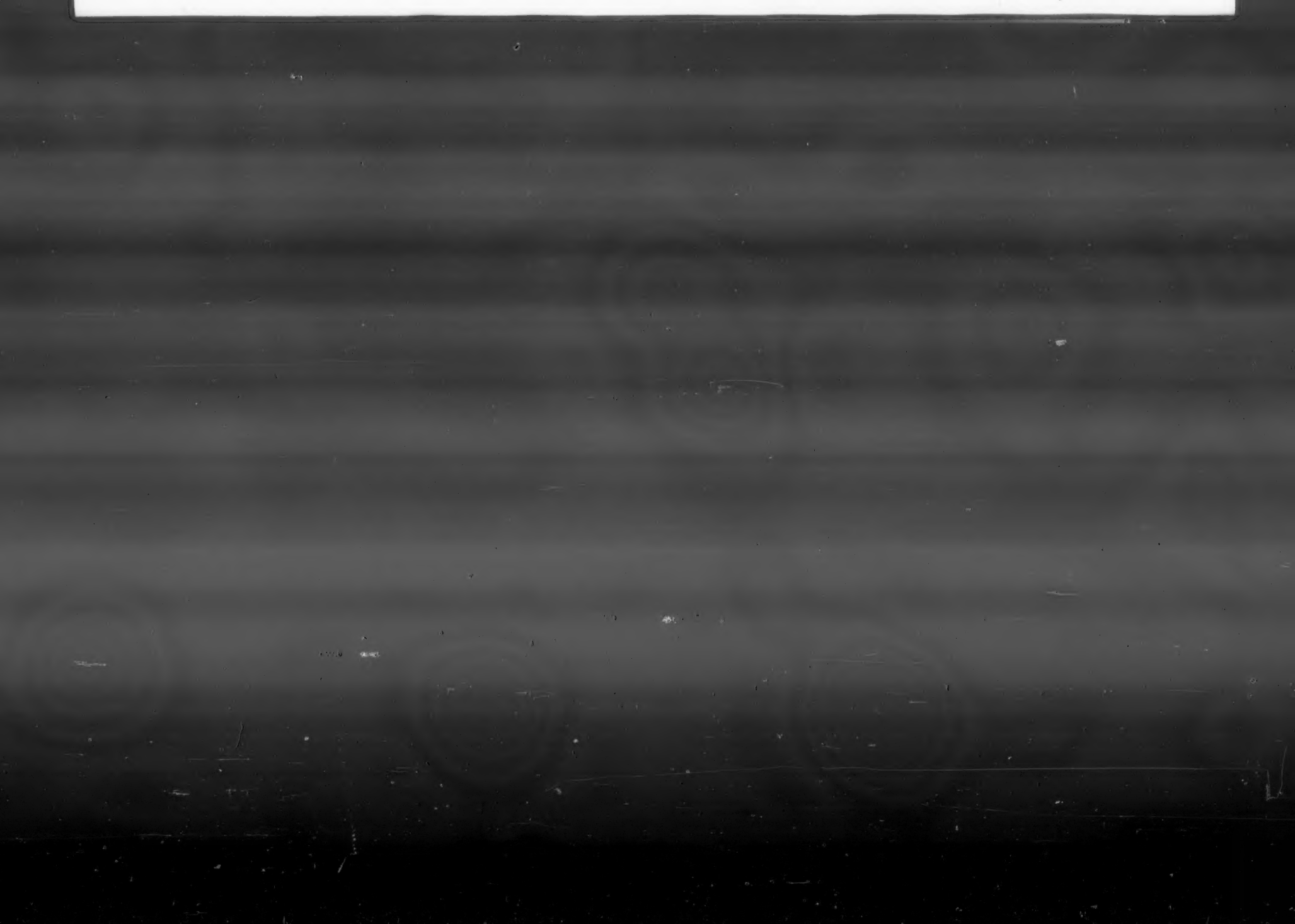
Thunderstorms are composed of giant cells. There may be one or several cells in the same convective cloud. The cells cover a lopsided circle or ellipse horizontally over the ground. The largest dimension of the cells is approximately seven miles. The cells range in height from a few thousand feet for those just starting to build to more than 50,000 feet for those that have reached their peak. In the Project, cells were actually measured which were over 56,000 feet high.

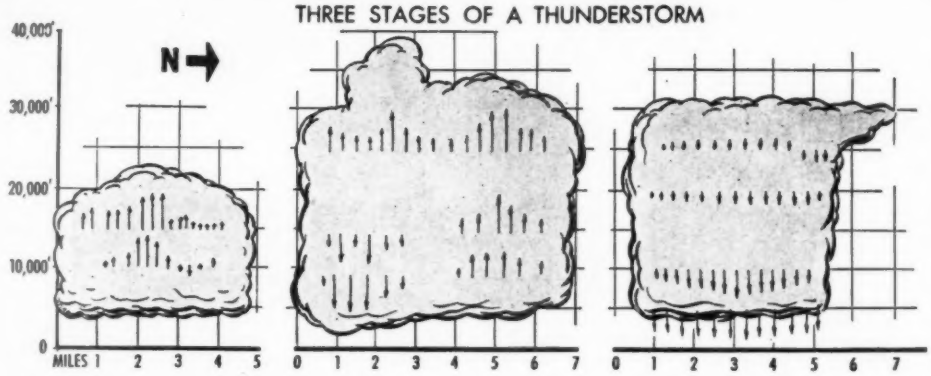
The history of each thunderstorm cell can be divided into three parts:

DEVELOPMENT OR CUMULUS STAGE. The vertical currents



Relative turbulence in a thunderstorm is suggested by curve based on Project research. The cloud is not drawn to scale. Actually, the turbulence is a function of altitude inside the storm—and there is very little turbulence in the clear air around the storm. Dotted rain curve line shows the increase of turbulence in rain.





Understanding of developing (left), peak (center) and dissipating stages of a thunderstorm cell helps pilots fly them. Most turbulence exists only during peak stage. There are one to several cells in a single convective cloud and they may be in different steges. Their characteristics are described in the article.

are all upward and appear to be uniform through any horizontal level of the storm. These updrafts usually have increased velocity with height. The updrafts continue, apparently, until raindrop coalescence reaches such proportions that the rising air currents can no longer carry the increasing amount of water. As the water begins to fall through the rising air currents it soon localizes and a downdraft becomes established—always in conjunction with the falling rain. At this point, the thunderstorm cell reaches the peak stage.

PEAK STAGE. There is no longer a universal updraft. The lower portion of the storm contains a major updraft localized near the leading edge of the cell and a major downdraft occurring with the rain in the central and rear portions. The speed of both updraft and downdraft usually increases with altitude. In the upper third of the cell there is only updraft. The cell changes shape from a circular cross section over the ground to a pear-shaped cross section with the updraft in the larger end and the downdraft in the smaller end. By the time the downdraft area at the base of the storm exceeds the area of the updraft, the cell passes into the dissipating stage.

DISSIPATING STAGE. The predominant structural feature of the dissipating stage is a downdraft at all but the highest altitudes. The speed of the downdraft is usually less than in the peak stage. The rain under the cell has lessened and the pear shape is now reversed, with the largest end containing the downdraft. As the updraft dies out altogether, the cell again becomes circular. Divergent surface winds blow outwards in all directions from the rain areas—that is, the downdraft areas.

Throughout the storm, the gusts (smaller-scale turbulences as distinguished from the longer-lived drafts) are found concentrated within the cells. Between cells, even within the same cloud, the air is entirely devoid of gusts exceeding a few feet per second.

Given this simplified description of the anatomy of thunderstorms, and given other research information gathered by the Thunderstorm Project, what conclusions can we draw about flying in or through them?

1. *Turn around before you enter the storm.* The rule of 180 is still the wisest rule for all pilots. None of the rules outlined here are meant to suggest that you shouldn't stay out of thunderstorms if you can.

2. *Don't try to fly over the top.* In the old-time pilot's lore, which has often been accepted as gospel, it was commonly accepted among pilots that if they had the planes and equipment (including pressurization and or oxygen) to fly over 20,000 feet, they could usually get over nearly any thunderstorm into regions of calm and placid air. Unfortunately, this is an over-simplification.

More than half of the 185 thunderstorms observed on the Project extended above 35,000 feet. The absolute maximum height was measured at 56,000 feet. These figures give the radar-measured top, and the actual cloud probably extends somewhat higher than this. "Over the top" is not feasible.

As a practical matter, however, pilots of pressurized planes flying at 20,000 feet can fly between saddlebacks and avoid any thunderstorms they can see, even remaining contact most of the time. There are almost always clear pathways around the high-towering convective thunderstorm clouds. This is the most popular technique of airliners flying through thunderstorms in the mountains.

(*Continued on page* 64)

SUMMARIES OF WEATHER INTENSITIES AT VARIOUS ALTITUDES OF FLIGHT

	WEATHER PHENOMENON	Flight Altitude (feet)				
		5,000	10,000	15,000	20,000	25,000
GUST VELOCITIES	U_e 4 f.p.s.	No significant variation within lower 25,000 feet of storm				
	U_e 14 f.p.s.		NO DATA		NO DATA	
	U_e 24 f.p.s.		NO DATA	NO DATA		
ICING	All Types					
	Clear and Heavy Rime					
	Hail					
	Lightning Strikes					
	Heavy Rain					
	Heavy Snow					

KEY: NONE · RARE · INFREQUENT · MINIMUM · FREQUENT · MAXIMUM

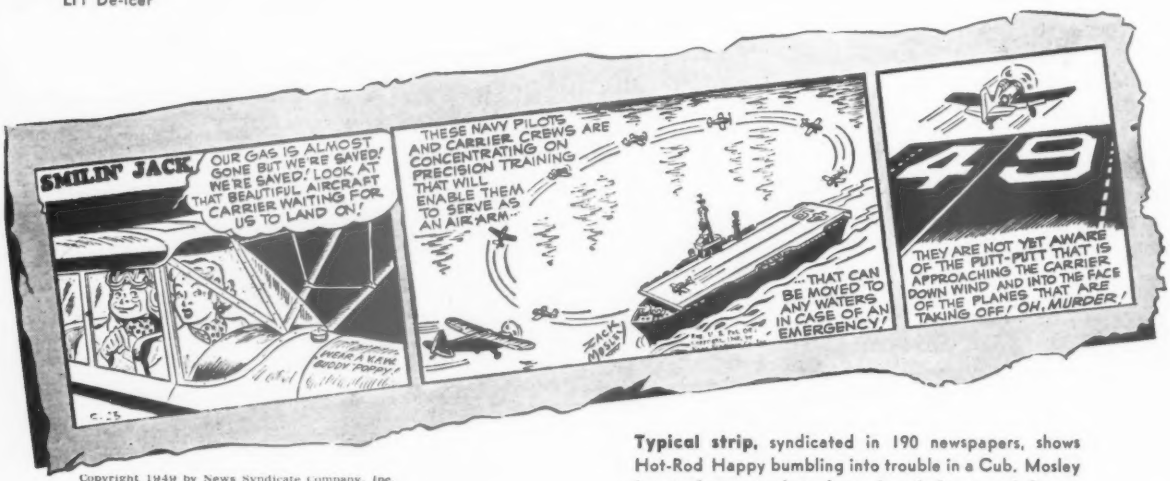
'SMILIN' ZACK'

Cherry

Stretch

Li'l De-icer

Cartoon is born as Mosley works in studio at his Stuart, Fla., home. One week of "Smilin' Jack" requires about 140 man-hours. Mosley is helped by two assistants, but does major part himself.


SMILIN' JACK
OUR GAS IS ALMOST GONE BUT WE'RE SAVED! WE'RE SAVED! LOOK AT THAT BEAUTIFUL AIRCRAFT CARRIER WAITING FOR US TO LAND ON!
THESE NAVY PILOTS AND CARRIER CREWS ARE CONCENTRATING ON PRECISION TRAINING THAT WILL ENABLE THEM TO SERVE AS AN AIR ARM...
...THAT CAN BE MOVED TO ANY WATERS IN CASE OF AN EMERGENCY!
4 9
THEY ARE NOT YET AWARE OF THE PUTT-PUTT THAT IS APPROACHING THE CARRIER DOWN WIND AND INTO THE FACE OF THE PLANES THAT ARE TAKING OFF! OH, MURDER!

Copyright 1949 by News Syndicate Company, Inc.

Typical strip, syndicated in 190 newspapers, shows Hot-Rod Happy bumbling into trouble in a Cub. Mosley inserts frequent plugs (see above) for armed forces.

Zack Mosley and his cartoon hero, "Smilin' Jack," have been boosting aviation since 1933.

By BRUCE DEUTSCH

Supersonic Sable

IT'S bad flying technique to attempt to land an airplane downwind on an aircraft carrier flight deck.

This not altogether revolutionary fact was learned by millions of comic strip readers who a few months ago saw a despicable show-off, Mr. Hot-Rod Happy, try the stunt and wash out his *Cub*. For this and other items of aeronautical intelligence, plugs for air shows hither and yon about the country, and some strongly slanted editorial matter that might be unkindly termed "aviation propaganda," these millions of fans are indebted to airman-cartoonist Zack Mosley and his syndicated "Smilin' Jack" cartoon story.

For 16 years Cartoonin' Zack and "Smilin' Jack" have served up to their readers a menu of daring high-speed aviation adventure seasoned with aviation publicity and informative tid-bits. The readers love it, and the aviation industry has never complained about the free advertising.

During his exciting existence in the land of ink on bristol board, Smilin' Jack has flown everything from *Jennies, Cubs,* and gliders as a civilian pilot to jet jobs and B-29's as an Air Force officer. He has been eyed covetously by a thousand girls, all beautiful enough for Hollywood; but gals are second choice to planes in Jack's life. He has had a full share of crashes, bail-outs, and other narrow escapes from death in the air.

On the ground he has suffered bankruptcy and the assaults of uncountable goons and hoodlums employed by assorted sinister characters. He has been the nemesis of a prisonful of thugs, thieves, murderers, foreign agents and confidence men.

In World War II he flew against both the Germans and Japs and was captured by the latter. In languid pre-war days he did a few stints as a flying soldier of fortune in mythical Latin American revolutions.

Cessna-owner Mosley, shown here with his wife Betty, trades planes as a hobby. He has owned an Aeronca C-3, Cub Coupe, Rearwin Cloudster, three Stinsons and a Beech Bonanza.

Probably more interesting than his cartoon creation and equally handy with an airplane is Cartoonist Mosley. A tanned Floridian, he possesses some of the traits of three of the characters his pen has begot. He shares with Flannel-mouth Don a penchant for air shows and fantastically patterned sport shirts. He can be Smilin' Jack, the deep thinker, or Downwind Jaxon, the fun-loving guy. Strictly a man's man, the stories Mosley tells at hangar bull sessions aren't always aeronautical.

A resident of Stuart, Fla. (near Palm Beach), Mosley frequently uses peninsular Florida as the setting for "Smilin' Jack" adventures.

After completing two years of art school in Chicago in 1928, Mosley worked as a cashier in a restaurant while trying to develop a comic strip whose principle character was an amorous soda jerk. Nothing ever came of it but rejections from the syndicate editors.

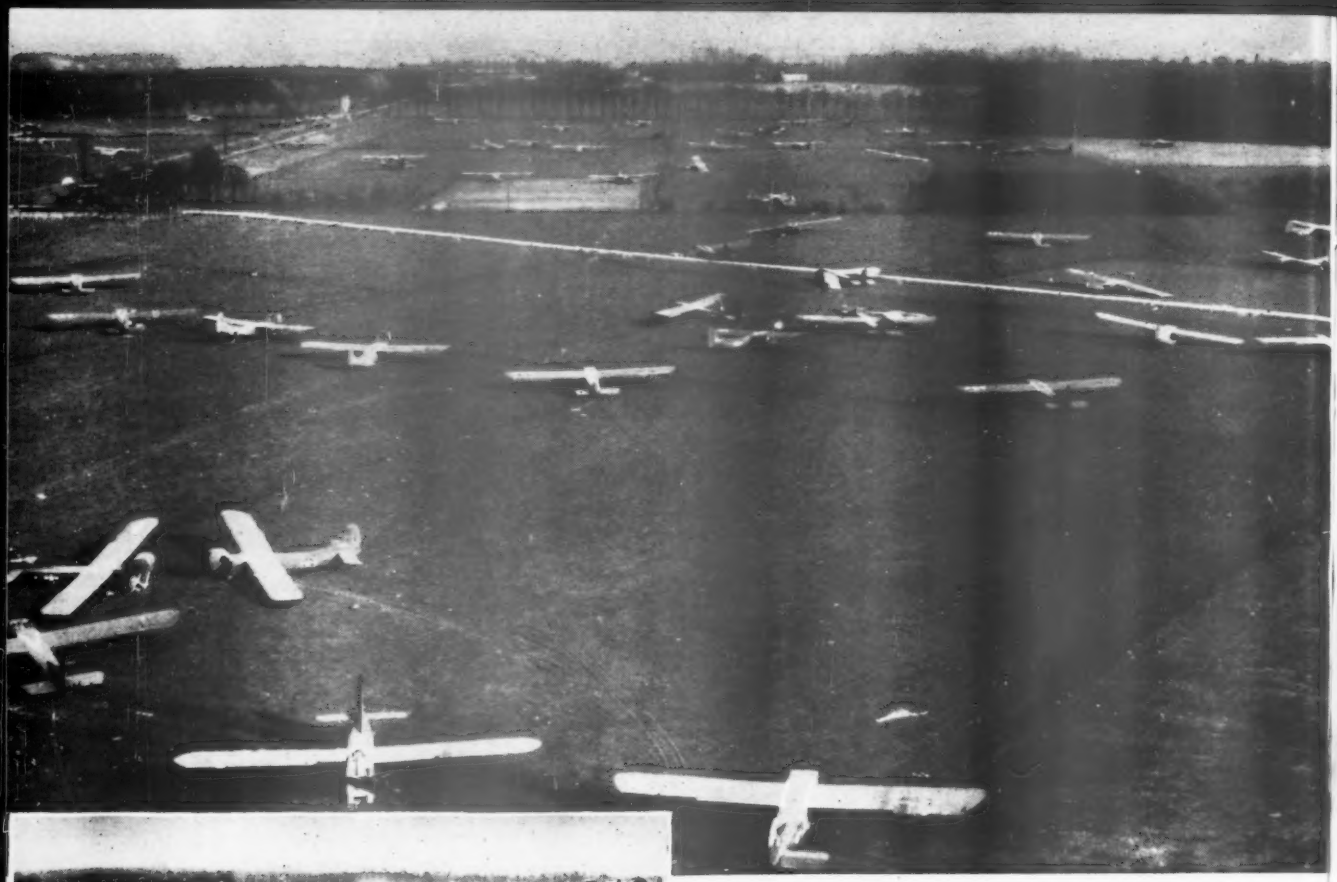
For a year Mosley was an assistant artist on the staff that prepared the "Buck Rogers" comic strip. Then in 1930 he was hired as artist for "Skyroads," an early wild-haired strip about impossible flying feats. "It was pretty amateurish and fantastic," Mosley comments. "Another fellow wrote it. I was only guilty of the art." But the "Skyroads" job was the cornerstone of Mosley's future. As he drew its planes and airmen his personal interest in aviation grew. One summer day in 1932 he went out to Chicago Municipal Airport and took his first flying lesson. After that, Mosley began to dream of a future in which he could be his own boss and have enough money and time for further flying. Eventually an idea was born. He would combine his aviation and art interests and produce a comic strip with an aviation motif—a realistic one, not another fantastic "Skyroads."

So, in 1933 Mosley left Chicago and headed for the New York syndicate offices with sample panels of the cartoon story of a handsome, mustached free-lance pilot. At the Chicago *Tribune* and New York *News* Syndicate he was agreeably surprised when his brainchild received the enthusiastic approval of the late Capt. Joseph Patterson, the syndicate head and *Daily News* publisher. Mosley and "Smilin' Jack" were "in."

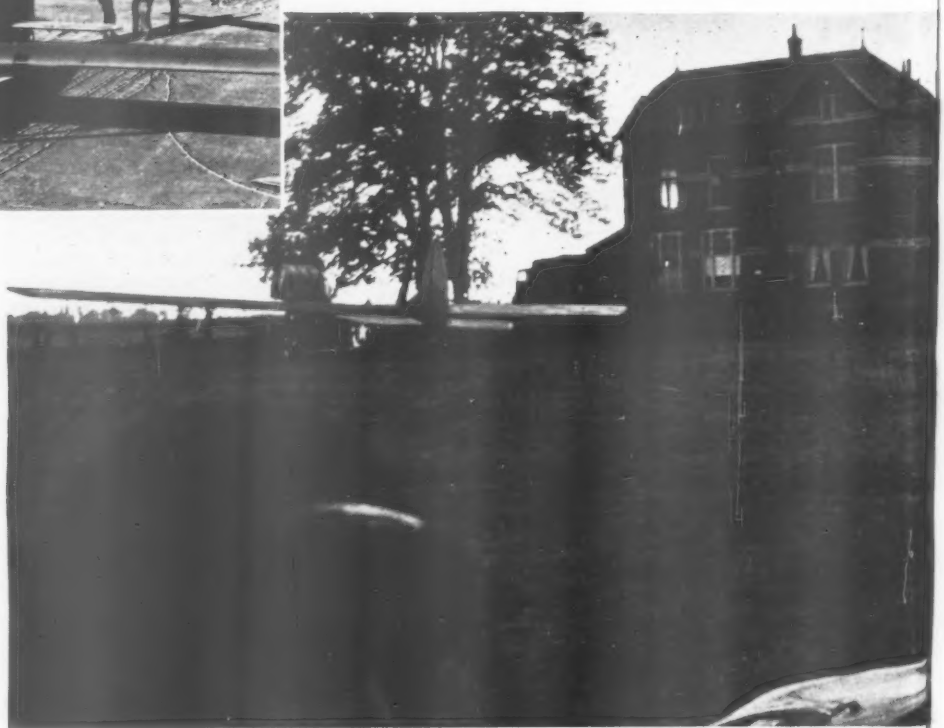
Since its first appearance in five newspapers in October, 1933, "Smilin' Jack" circulation has zoomed past 15 million. Today it is featured in 190 papers throughout the United States, Mexico, Cuba and in parts of South America and Europe.

Relentlessly pursuing his aviation hobby—perhaps in a vain effort to keep up with Smilin' Jack—Mosley has logged over 2,500 hours in the U. S., Canada, Cuba, Mexico and South America. He has flown practically every single-engined civilian plane type plus ex-Army PT's and BT's, twin-engined Beech and Cessnas and a PBY-5. Next to actually flying, Mosley's favorite aeronautical pastime is trading planes. He has owned an Aeronca *C-3, Cub Coupe,* Rearwin *Cloudster,* three Stinsons, a Beech *Bonanza,* and his present Cessna 170.

An enthusiastic aviation (*Continued on page* 72)



Gliders and towplanes mass for airborne invasion of Europe (left). After landing in combat zone (above), CG-4A's and British Horsa's dot landscape. The author, a flight officer, was pilot of a CG-4A.



Near Nijmegen, the objective of "Operation Market," glider lands on lawn of Dutch estate. Jeep, carried in CG-4A, is emptied by crew.

It was just a "routine mission" but 16 gliders almost ended in Nazi-held Berlin.

On a Slow Rope to Holland

By

Sgt. H. E. HARRINGTON

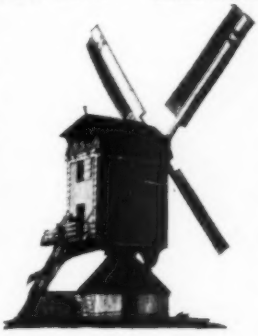
During World War II, the author was a flight officer and glider pilot with the 45th Troop Carrier Squadron.

EARLY ON THE sunny morning of September 18, 1944, I started checking my CG-4A glider in preparation for a combat air strike at Nijmegen, Holland. Several hours later, I called the roll of five airborne soldiers who were to ride along on the cross-channel mission. They were all assembled: Corporal Kjellander, and Privates Whitford, Hartford, Rais and Pequignot. I didn't know their first names—still don't. And I have never heard from one of them since carrying them and 3,356 pounds of combat equipment into enemy-held Europe.

About 1 p.m., the mission (which had been dubbed "Operation Market") was ready to get underway. I walked to the tow plane, piloted by Lieutenants M. F. Kuna and Austin Brim, nervously discussed a few final details, exchanged wishes of good luck, and returned to my glider.

Up ahead, the whine of inertia starters and the coughing of engines indicated that the show was about to go on the road. Within minutes, a cyclone blasted down the runway as the fleet of assembled C-47's revved up their engines, checked mags and pitch controls.

Before boarding my glider, I checked the tow-rope and the release mechanisms at each end. The release was a sturdy clamp device which could be operated from a lever in the glider cockpit or from the "office" of the tow plane. The rope was nylon —about ¾ inch in diameter and 300 feet long.



The rope looked in good condition but to make sure I put my full weight on both connections. I then walked around the glider, checking aileron hinges, strut bolts, elevators and rudder. With a final kick at the tires, I entered the rear door and crawled over the gun, men and equipment to my seat in the nose. It wasn't necessary to struggle into a chute harness for the simple reason chutes were "out" on this trip. Command had decided as long as there were insufficient chutes for both pilots and passengers, it wouldn't aid the morale of the commuting soldiers to see the pilot in a position to step out in case of trouble. We couldn't argue that point.

The prop-wash increased in intensity and threatened to blow the parked gliders into collision. It was necessary for me to release the parking brake, ride the foot brakes (which were hydraulic and of excellent quality) and ground fly the glider. When exceptionally powerful blasts shook the glider, I elevated the tail and placed the wings in a flight position—then applied spoilers. These were pet controls of all glider pilots, operated by large levers on both sides of the cockpit. The spoilers rose on the upper airfoil, created a burble and destroyed about 25 per cent of the lift. We were dependent upon these controls and used them on all landings, both to lose altitude quickly and to prevent ballooning once we were on the ground.

The airspeed needle flickered madly as the tube caught gusts. We had a full set of navigation instruments because gliders were designed for long, free glides at night. We had landing lights and light signals. We even had a small radio. The controls were wheel type and comfortably located.

The CG-4A was in its element during free glides and while practicing without cargo. Glider pilots often used the speed of the tow (120 m.p.h.) for a big easy loop upon releasing, then descended in a series of steep banks, lazy-8's and spirals. But such antics were limited to ferry trips or casual flying. Most of the time we drilled on strict pattern approaches. Loaded with sand bags we practiced the art of hitting the field and taxiing our motorless planes to positions which would leave clear landing space for following waves of gliders.

(*Continued on page* 54)

Rate Your Fellow Pilots

It's difficult to be unbiased when rating yourself. But ask another pilot to measure your flying ability with this test.

By ROBERT C. SELLERS

IT IS THE PRIVILEGE of every pilot to think of himself, privately at least, as a hot rock of the first magnitude. Whether he is or not is an evaluation that he is not altogether qualified to make for himself. He can give it a try, however, and if he is an exceptionally broad-minded character and can view himself more or less dispassionately, he may come pretty close. But another experienced pilot probably can do better by him than he can himself, and vice-versa.

At the risk of breaking up innumerable friendships of long standing, therefore, FLYING presents the accompanying chart or check list for rating your fellow pilots. A set formula for evaluating a pilot is, of course, an impossibility, but an approximation of it can be extremely useful. The check list printed here is a combination of ideas from the check lists used by two scheduled airlines. Slight variations have been made, since aircraft and pilot training standards differ between the airlines and private flying.

The chart can actually be used without a flight test by someone who is familiar with your flying ability, but of course a flight test is always better.

The method presented is greatly superior to the average flight test in which the pilot is rated as being "good," "fair," or "poor." The main problem with these older methods is that no one really agrees as to what each of these words mean. The use of a numerical scale, running from 1 to 10, is even more indefinite and offers more room for abuse.

The chart is divided into four main categories: (a) flying ability, (b) aeronautical knowledge, (c) efficiency, and (d) personal qualities. Each is important. Together, they constitute factors which will make or break a pilot.

Before you start rating yourself or some other victim, study the chart and eliminate items which do not apply to the type of flying being rated. For instance, if you never do radio range flying and do not have a radio-equipped aircraft, cross out the items which apply to that subject.

If you try to rate yourself, be honest. If your landings have slipped lately, downgrade yourself. Put yourself in the place of a check pilot who doesn't know you and who is sitting in the seat next to you. Write what you honestly believe he would write if you were in his place and someone else was at the controls.

The list is valuable not only for individual use but for flying service operators who want to study their students or check any new renter pilot who comes along.

Seriously, this is more than a game. The yardstick on the opposite page has definite value. Development of poor flying habits breeds a chain of increasingly bad habits that can only end in disaster.

If you show up poorly on the chart, don't just forget it. And don't blame the man who is rating you. Do something about correcting your pilot deficiencies. END

HOW GOOD A PILOT ARE YOU?

Check Appropriate Squares

	SUBJECT	A		B		C		D	
FLYING ABILITY	ABILITY TO PLAN FLIGHT INTELLIGENTLY & ACCURATELY		Exceedingly Well		Careless		Usually Concerned		Needs Training
	WEATHER CHECK		Always Checks Maps & Sequences		Never Looks at Weather Reports		Usually Interested		Occasionally Checks Weather
	COCKPITCHECK (Checklists, Starting, Stopping)		Always Checks Carefully		Ignores Completely		Usually has Gadgets in Order		Looks Things Over Haphazardly
	TAXIING & RUNUP (Use of Brakes, Parking)		Handles Extremely Well		Rough on Brakes and Parking		Usually Satisfactory		Just Fair
	TAKE-OFFS		Excellent		Unable to Control Plane		Some Good Some Fair		Uncertain
	CLIMB (Use of Power, Control)		Steady—Good Direction Proper Airspeed		No Control of Airspeed or Direction		Usually Good		Erratic, Needs Prompting
	CRUISE		Excellent—Constant Altitude & Direction		Incapable of Holding Altitude & Direction		Some Room for Improvement		Careless of Altitude & Course
	HANDLING OF AIRPLANE		Accurate and Smooth		Rough and Jerky		Knows How, Needs Practice		Not Positive
	COCKPIT PROCEDURES (Keeping Log, E.T.A.'s, Anticipation of Check Points)		Excellent		Sorry Mess		Prompt and Neat		Needs Training
	INSTRUMENT FLYING		Exceptional Ability		No Ability		Mostly Good, Needs Practice		Erratic Under Pressure
	RADIO RANGE FLYING		Always in Groove		All Over the Sky		Learning		Seldom Accurate
	APPROACH FOR LANDING (Ability to Select Runway & Line Up)		Never Misses		No Two the Same		Usually Good		Occasionally Makes a Good One
	ATTENTION TO DETAIL		Never Forgets		Never Notices Anything		Reasonably Dependable		Improving with Practice
	EMERGENCY PROCEDURES (Forced Landings)		Always Alert		Winds Up in a Panic Every Time		Seldom Caught Napping		Needs Further Training
	KNOWLEDGE OF OPERATING LIMITATIONS (Aircraft)		Knows the Book		What's a Red Line for? Attitude		Usually Aware of Them		Needs Study
KNOWLEDGE	RADIO EQUIPMENT		Good Operator		Totally Unfamiliar		Some Room for Improvement		Easily Confused
	ESTIMATES, USE OF COMPUTER		Very Accurate		Doesn't Know How		Slow but Good		Guesses
	CIVIL AIR REGULATIONS		Knows Them All		Never Heard of Them		Fair Understanding		Spotty Knowledge
	KNOWLEDGE OF LOCAL AREA WITHOUT MAPS		Knows Every Landmark		No Maps, No Knowledge		Uses His Maps		Needs Maps Occasionally
	FILING FLIGHT PLANS		Gets Them Accurately		Never Gets Them Straight		Generally Dependable		Usually Mixed Up
EFFICIENCY	PUNCTUALITY TO FLIGHT PLANS		On His Toes		Keeps Everyone Waiting		Few Complaints		Doesn't Care
	FLIGHT EQUIPMENT		Always Complete		Doesn't Bother to Provide		Usually Equipped		Always Something Missing
	COOPERATION WITH OTHER PILOTS		Gives to Full Extent		No Belief in Teamwork		Tries		Indifferent
	COOPERATION WITH GROUND PERSONNEL		Puts Himself Out		Doesn't Even Try		Usually Makes an Effort		Will Cooperate if Convenient to Him
PERSONAL QUALITIES	JUDGMENT		Unusually Sound		Often Faulty		Normal Errors and Successes		Too Hasty or Immature
	ATTITUDE		The Kind We All Want		Undesirable		No Criticism		Indifferent
	BEHAVIOR AS IT AFFECTS AVIATION		A Credit to Aviation		Counter to Best Interests		Nothing Conspicuous Either Way		Doesn't Appear to Care
	SENSE OF RESPONSIBILITY		Assumes and Employs Judiciously		Completely Lacking		Properly Appreciates		Not Sticking His Neck Out
	FLYING TEMPERAMENT		A Natural		Totally Unsuited		Ranks with the Majority		Not Quite Up to Par
	SELF CONTROL		Superior		Little Apparent		Possesses to a Normal Degree		Exercises It When He Wants to
	EMOTIONAL STABILITY		Possesses it to Considerable Degree		Shows Little if Any		Even Going		Frequently Disturbed
	SELF CONFIDENCE		The Right Kind to the Proper Degree		None or Unwarrantedly Excessive		Reasonable Respect for His Abilities		Could Stand Some More
	WITH THIS MAN AT THE CONTROLS—WOULD YOU:		Allow Your Family to Ride With Him?		Hesitate to Trust Him Completely at Any Time?		Feel Reasonably Safe Under Nearly All Conditions?		Fly Only Under Favorable Conditions?

Basic Key

1. All checks in Column "A"—Rate Yourself SUPERIOR.
2. Combination of checks in Columns "A" and "C"—Rate Yourself EXCELLENT if checks in Column "C" do not exceed Four. Rate Yourself GOOD if they Do Exceed Four.
3. Combination of "A," "C," and "D" Rate Yourself AVERAGE if checks in Column "D" do not Exceed Three.
4. Combination of any with one in Column "B" Rate Yourself BELOW AVERAGE.
5. If checks in Column "B" exceed Two Rate Yourself POOR.
6. If checks in Column "B" exceed Three Rate Yourself DANGEROUS.

The Instructor Flies Blind

Texan, a primary trainer, has poor visibility from rear seat.

If a Navy pilot starts turning grey, he is probably pulling duty as an instructor.

By JOHN P. WEINEL

DO YOU like to fly with the cards stacked against you? Would you enjoy landing and taking off with completely restricted visibility in every direction except straight up? If your answer is yes, you would be very happy as a primary flight instructor in the Navy.

Not so long ago the Navy eliminated the *Yellow Peril* (Stearman N2S) as a primary training plane. Substituted in its place was the North American SNJ *(Texan)*, which had been used in various stages of advanced and tactical training. Immediately, hearts began bleeding for the poor student. How could he be expected to master the intricate details of a relatively fast, low-wing monoplane in less than 20 hops? He would have to handle wheels, flaps, prop pitch, mixture control, carburetor heat, gasoline selector, and a million and one other items that were non-existent in the *Yellow Perils*. Why the poor student would even have to worry about opening and closing a hood! He would never make the grade.

So 100 students were picked at random. They were started out in SNJ's on their very first ride, and started out in the front seat. The experiment was a success and now the use of an SNJ as a primary trainer is an accepted fact. But the weeping and wailing for the poor student, although diminished, can still be heard above the roar of the *Texan's* 600 mechanically hitched horses. Yet few tears have been shed for the poor instructor.

He is a naval aviator with some experience and about 2,000 hours. He has had the benefit of some excellent schooling in the art of instructing, both on the ground and in the air. To the casual onlooker he is still the nonchalant, happy-go-lucky guy with a sweat-stained flying suit. His problems appear minor. But they aren't.

Would you like to depend on someone who has never been in an airplane to start the plane, pull your wheels up, and adjust your mixture? Would you enjoy flying along, depending on one scared student to let you know if you are about to run into another plane ahead? Sure, the student can be taught. As a matter of fact the average student solos in less than 20 hops. But in the process, pity the poor instructor!

The first ride the student takes in the SNJ is more or less "on the house." For the only time in his flight training he can sit back and relax while the instructor takes him for a ride around the area. And in deference to the student's innocence of flying experience the instructor even tries to do the looking by flying in a continuous turn or skid. After this little joy ride the student goes to work. He begins to learn, and the instructor's hair begins to turn grey. If his student turns out to be a knucklehead his chances of turning completely grey are excellent.

On the third hop the student makes the take-off. Most instructors keep their hands and feet within 1,000th of an inch of the controls. The more foolhardy will back away from the stick and rudder about 100th of an inch. Naturally the plane swerves all over the runway and finally the instructor pulls it off to avoid hitting a soft shoulder or a crash truck or some other formidable object. But it usually isn't a bad take-off, considering. The student might even pull the wheels up without jerking the plane up into a stall or diving it into the ground while he has his head in the cockpit looking for the lever. A good student will throttle back to within five inches of climbing manifold pressure. But when the cadet reaches over and pulls the mixture control back instead of the prop pitch control, the

INSTRUCTOR'S VIEW IN SNJ LANDING

1 "There she lies. Even a dodo ought to be able to hit her."

2 "He's turning onto final, now. Seems to be doing okay."

3 "I'd better enjoy this view of the strip; it's my last."

4 "Is he lining up? Seems to me he's too far to the left."

5 "Everything must be all right. He doesn't seem nervous."

6 "Ah, there's the edge of the pavement. We made it—I guess."

instructor is well on his way to being white-haired. An airplane engine will not run without gasoline, and an airplane will not fly very far without an engine, and 50 feet isn't a hell of a lot of altitude!

Everyone makes mistakes, and aviators usually make their full allotted share. To avoid mistakes the Navy teaches the student to be alert. This is an admirable quality and it is not to be derided. The student demonstrates his alertness by reporting over the interphone all airplanes he sees up ahead of him. It gets tiresome trying to dodge all the reported planes. At least 99 per cent of them are five miles away and there are only some 200 other planes in the general vicinity. But the instructor is a forgiving and an expecting soul. He always expects something really good out of the student in the next maneuver, or the next flight, or the next phase.

A mother robin teaches her young how to land in one easy lesson. She merely pushes the fledgling off a limb and hopes for the best. The instructor teaches his fledgling by sheer hard work. First of (*Continued on page* 68)

Rent or Buy?

If you fly more than four hours a week, don't rent a plane. It's cheaper to own a lightplane when your logbook shows over 200 hours a year.

By BEN ROBIN

PILOTS who fly for pleasure can answer yes to one of the following questions.

Do you fly your own plane?

Do you rent a plane when you want to fly?

Most pilots who buy flying time from an airport operator have at one time or another thought about owning a plane. Almost every plane owner I have met has grumbled occasionally about poor hangar service, the high cost of gasoline, or some other owner's problem. Which group is right? Should you rent or buy a plane?

Before discussing this problem, I must first ask another question. Do you fly more or less than 200 hours per year? If the answer is more than 200 hours, buy a plane of your own. If you do not fly at least 200 hours (approximately four hours per week), it is cheaper to rent than to buy. This is not my opinion. It is simple arithmetic, based entirely on the financial considerations involved.

Ten years ago I didn't stop to think about the finances. I plunked down my dough and owned a plane. Then, I paid an instructor to teach me to fly it. When I added up the numbers, I got the figures in the table accompanying this article.

COST PER HOUR FOR 200 FLIGHT HOURS PER YEAR*

	$2,500 Two-Place Plane Cost Per Hour	$9,000 Four-Place Plane Cost Per Hour
Gasoline	$1.50	$3.30
Oil, including changes	.20	.25
Maintenance	1.00	2.00
Insurance	1.90	5.00
Depreciation	1.00	3.60
Hangar Rent	1.25 ($20 per month)	1.50 ($30 per month)
Total	$6.85	$15.65

* Approximate

Ouch! Don't yell so loud. I can hear you. You say my addition is correct but the numbers I put down are all wrong. Okay, let's see if they are. Examine each item in turn.

First, look at the $2,500 lightplane figures in the chart. Gasoline sells for an average price of 30 cents per gallon. An 85-h.p. engine uses a little over five gallons per hour. That adds up to about $1.50 per hour, doesn't it? You may have a plane with only 65-h.p. and a gas consumption of about four gallons per hour. Your plane may also be equipped with a 100-h.p. engine and burn six gallons hourly. Eighty-five h.p. and a five gallon hourly consumption is therefore a good average for the lightplanes available today.

The next item is oil (including changes). Oil sells for an average price of 40 cents a quart. It should be changed every 20 hours. Most light engine crankcases have a five quart capacity. Adding five additional quarts between changes allows a consumption of approximately ¼ quart per hour. Anything wrong with these numbers? I don't think so.

The $1 hourly maintenance charge includes 100-hour checks and major overhauls. Occasionally tires and fabric need replacing. For the first 200 hours the lightplane owner may spend considerably less on maintenance than the $1 hourly charge allotted for this purpose. Over a period of years, however, after a major overhaul on the engine, and a wing recover job, the $1 will prove a conservative hourly average.

The insurance figure of $1.90 per hour includes all airplane risks, less 10 per cent deductible on damage while the ship is in flight, landing or taking off. A rate of $12.80 per hundred is an average charge for this coverage. If a crash occurs resulting in a complete washout, the assured must pay the first $250 but the insurance company will suffer the balance of the $2,250 loss. This coverage on a new plane valued at $2,500 is about $320 per year. Minimum limits of $5,000/$10,000 for liability and property damage costs about $31 per year. An additional premium of about $31.50 covers one passenger. This brings the total insurance cost to $382.50 per year, or $1.90-plus per hour, based on 200 hours flown in any one year. This coverage does not include insurance for the pilot or the first 10 per cent damage sustained in crashes. Let's go on.

I set the depreciation rate at $1 per hour based on a plane life of 12½ years. With good maintenance, your plane may fly longer than 12½ years and 2,500 hours, but most lightplanes of this age and hours sell for less than $500.

If you fly only 200 hours a year and pay a $20 monthly hangar rent, your hourly cost for this item breaks down to approximately $1.25.

Combining all of the items listed gives us a total cost of $6.85 per hour or $1,370 yearly if we fly our plane 200 hours each year.

Most pilots who rent planes believe that they would fly a great deal more than 200 hours yearly if they owned an airplane of their own. You are the best judge of your own estimated yearly flying hours. The hourly cost of insurance, depreciation, and hangar rent would drop proportionately as the yearly hours above 200 increase. Gasoline, oil and maintenance charges would remain fairly constant.

A friend of mine who has owned lightplanes for the past five years recently sold his plane. When I questioned him, Joe explained that he now flies only about 100 hours each year.

"I don't fly enough to keep the hourly cost low," he said. Another friend who is a sales- (*Continued on page* 67)

"We made a discovery that will shake the world; shake the world good, no? Yes."

WHERE IS *Russia with the Atom?*

By HY SHERIDAN

Contributing Editor of FLYING

FLYING's chief spy concludes that soda pop may wreck the world.

THERE seem to be a lot of splits among the atom people as well as among the atoms. When one hears a pop nowadays one is never sure whether it is a senator or a bit of uranium.

All this is completely silly since everyone but a senator understands the only real secret about the atomic bomb is why self-labeled rational men do not know better. Horse sense is missing somewhere—we call it horse sense because horses have the wit to keep their posteriors behind them whereas we humans elect them to office.

While in Mexico City a few days ago, walking along the street minding my own business—I don't know the language—I was suddenly seized with a fit of sobriety and I went into a convenient *cantina,* where I sat down beside an imposing gentleman who imposed upon me for a drink or two by stimulating my curiosity with a hint at once strange and frightening.

I knew immediately that he was a Russian. He couldn't have been an Englishman because I could understand what he said. He could not have been an Irishman because, as he assured me, he wanted to conquer the world whereas the Irish merely want to beat it up.

How do you expect to do this? I asked him. At first he exhibited a singular reluctance to reveal anything except a most admirable thirst, and I suspected him to be a pedagogist (rather than a member of, say, the State Department), possibly a university professor.

He had been drinking vodka, a rather light potation, and so I offered him a nip of Jameson, which has a most overpowering effect. It is always difficult to distinguish gratitude from intoxication, but in return, at any rate, the Russian gave me the latest reports of the present status of atom bomb thought and progress in what we might term the Russian ward. I was afraid to give him a second glass of Jameson for fear that he would give me Poland. Everybody who has had Poland has given it back.

It was all a lot of fun while it (*Continued on page* 62)

Cockpit layout is functional. Flight instruments are at left, engine gauges in center.

FLYING's CHECK PILOT

EDITOR'S NOTE

This series of articles is planned to help the pilot and prospective plane owner evaluate aircraft now on the market. Only aircraft holding a CAA Type Certificate are flown. The authors evaluate each aircraft through the eyes of the average private pilot who flies an airplane for business or recreation.

DeHAVILLAND BEAVER

By GLORIA HEATH

An ex-WASP, pilot Gloria Heath holds flight and ground instructor ratings and commercial certificates for single and multi-engined planes, land and sea. She is Project Manager for the Flight Safety Foundation in New York.

THE Canadian-built de Havilland *Beaver,* now available for U.S. operation, is a plane which has been "tailor-made" for the backwoods pilot. The busy little *Beaver* has chalked up an excellent record in 20 months of Canadian service. Bush pilots swear that it combines almost every desirable feature of modern utility airplane design.

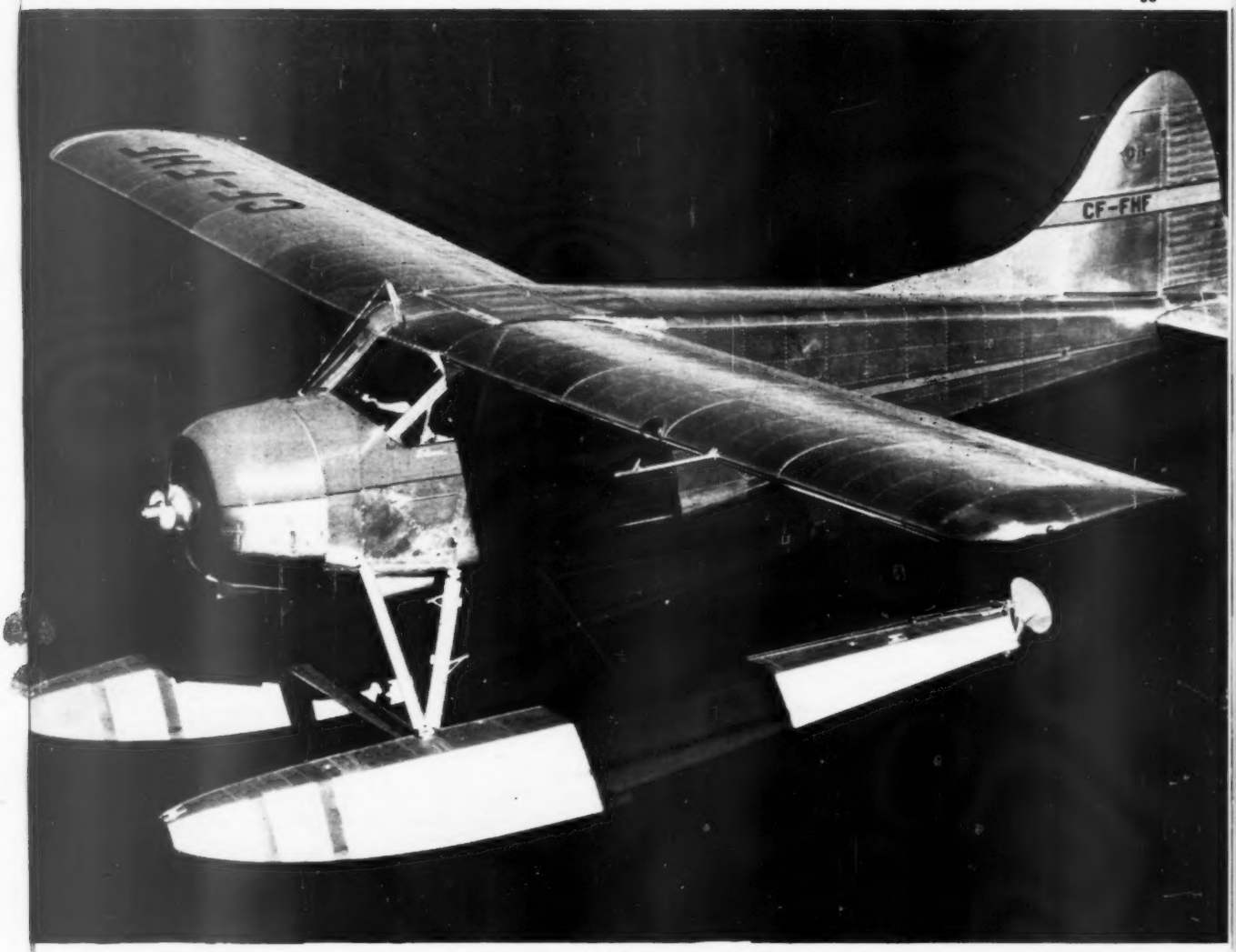
Based at scantily equipped outposts, the *Beaver* has operated in and out of mountain lakes less than a mile in length at 5000-feet altitude. It has served dependably in tropical heat and Arctic cold, unsheltered from rain, wind, snow and ice. *Beaver* service has included forestry patrol, survey flights for mine and pulp holdings, fire fighting, transmission line checking and repairing, personnel transport, and hauling oversized equipment to remote mine areas.

The *Beavers* sold in this country will show the standard N number and will be fully certificated by the CAA. The multi-purpose bush plane was first introduced to buyers in the United States when it was displayed at Newark in early summer. At this time I was taken on an inspection and demonstration flight and subsequently (*Continued on page* 74)

Oil tank and filler neck are inside the plane's cabin, facilitating quick access.

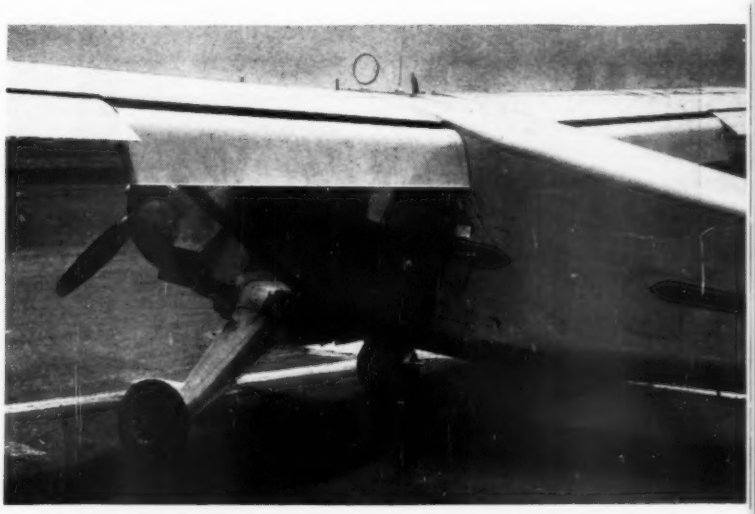
Gas tanks (capacity 87 gallons) can be filled by man standing alongside plane.

Battery (24-volt) can be serviced easily by sliding it from fuselage on a tray.



The 450-h.p. Beaver is all-metal. Seaplane version's payload (500-mile range) is 1,015 pounds. With floats, plane cruises at 132 m.p.h.

Four doors (two extra-large for cargo entry) provide access to the 150 cubic foot cabin. Beaver is a 6-7 placer.



Flaps down, the Beaver's ailerons lower automatically to 15°, giving additional lift, control. Plane has been in Canadian service for 20 months.

HOW TO BABY YOUR ENGINE

No. 2 Stretching the Life of Your Engine

By PETER ALTMAN

EDITOR'S NOTE

In the second of a series of three articles, aeronautical engineer Peter Altman discusses ways to prolong engine life. Vice-president of Continental Motors, Altman was director of Aeronautical Engineering Department of the University of Detroit from 1925 to 1940, and was head of the Manufacturing Research Division of Convair from 1940 to 1943.

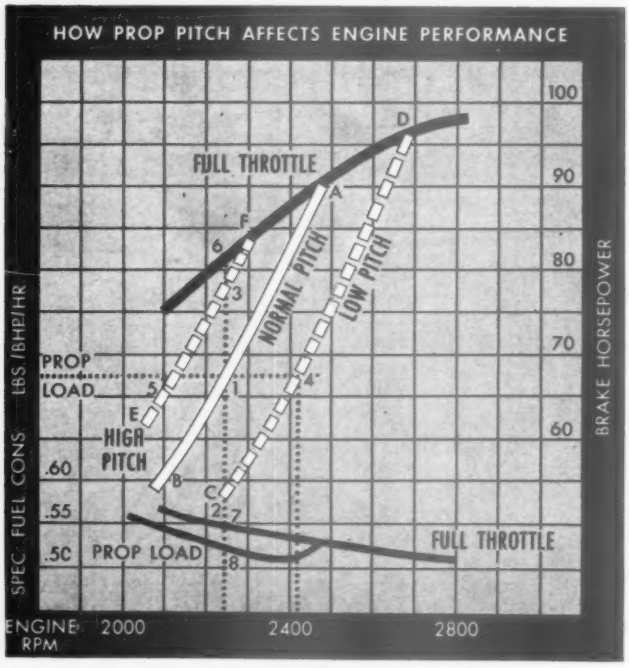


Figure 1 shows relationship between prop pitch and fuel economy.

DOES your engine burn too much fuel? Maybe it's your fault and not your engine's. Propeller pitch, throttle position, the carburetor metering jets and atmospheric conditions all play an important part in the amount of fuel used for a given flight. Bill Odom's nonstop flight from Hawaii to Teterboro is a good example of correct selection of all important factors. Most pilots cannot be expected to exercise equivalent care but attention to a few of the important details will be repaid by lower fuel costs.

The amount of fuel used is almost a direct function of the power absorbed from the engine. Higher cruising speed means more power, hence more fuel consumed and fewer miles per gallon. Flying at reasonably low speeds not only gives more miles per gallon but results in longer engine life.

The propeller pitch also has an important effect on fuel economy because it determines the engine speed for a selected airplane speed. Figure 1 shows the difference in the specific fuel consumption between the full throttle and propeller load curves.

Consider the normal pitch propeller curve A-B for which the fuel consumption curves are shown. If operation occurs at the recommended power and speed shown by Point 1, the average fuel consumption Point 8 is .52 lbs/BHP/hr. and for the 67.5 h.p. would be about 5.8 gallons per hour. If the cruising speed is 116 m.p.h. the plane would get 20 miles per gallon.

Taking an extreme case, assume that high propeller pitch is used, and that the propeller would absorb the full power of the engine at the same recommended engine speed of 2,250 r.p.m. as shown by Point 6, Figure 1. Cruising occurs at full throttle even though the engine speed is only 2,250 r.p.m.

The fuel consumption Point 7 becomes .55 lbs/BHP/hr., the power used is 81.5 h.p. and the speed would be approximately 124 m.p.h. Fuel will be used at the rate of 7.5 gallons per hour, which corresponds to only about 16.5 miles per gallon. Consequently, operating under this condition reduces the economy 22.5 per cent in addition to lowering the service life of the engine. The increase in speed is only eight m.p.h. or only about 7 per cent,

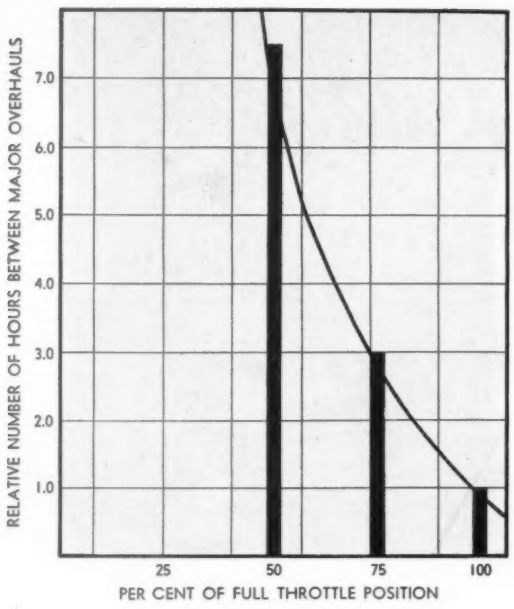


Figure 2

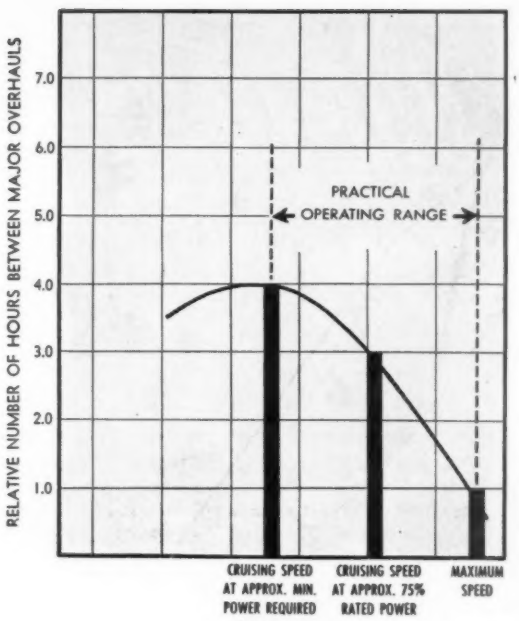


Figure 3

while the increase in power taken from the engine is 21 per cent.

The same general results apply with the normal or low pitch propeller if the increase in speed is obtained at the expense of increased power.

The fuel consumption data supplied by the engine manufacturer are average values, based on a good compromise between the high and low tolerance allowed for carburetor jets and other items which affect the rate of fuel flow. In some cases the operator may have an engine in which the fuel characteristics are towards the lean mixture and in others towards the allowable rich mixture. This will result in different values of fuel economy and if it is towards the high side the operator will often claim malfunctioning of the engine, especially if he happened to have one of the same model previously which was in the lean side of the average. The allowable practical variation for conventional carburetion is 10 per cent and if the fuel consumption is within this value it should be no cause for worry.

Too lean a mixture is not desirable because it results in high engine temperatures which may lead to detonation and other detrimental effects. Too rich a mixture results in high fuel consumption and improper engine operation. Proper setting of the automatic or manual enrichment is important to avoid rich mixtures for cruising conditions.

Proper adjustment of the mixture control at altitude is important to avoid over-rich mixtures and the operator should follow the manufacturer's recommendations to obtain the best results.

Engine Life and Throttle Position

The service life of an engine as measured by the time between major overhaul depends to a large extent on the amount of power which is taken from the engine at cruising speed. This in turn is a direct function of the throttle position. The number of times the engine is used for take-off and climb, and the duration of these maneuvers is also important. This is particularly true in training operations which involve many take-off, climb and landing maneuvers.

In this regard the internal combustion engine, whether of the aircraft type or not, is similar to any other machine. Its life depends principally on how much we take out and for how long.

Consider the CAA and military requirements for aircraft engines. For type approval the engine is required to operate for 100 hours at full throttle and rated power and 50 hours at other throttle settings. If the engine completes this test without a breakdown and all the parts are in acceptable condition after the test it is approved for production and assigned a type certificate.

It can be seen that on these assumptions, if engine is always operated at full throttle it will require a major overhaul at the end of 150 hours, though actually, most engines in production today will do much better. But consider a user who is practical in his operation and always flies at, say, 75 per cent maximum power. He will obtain much greater life from the engine and it will require major overhaul only about every 650 hours.

By similar reasoning, if the operation occurs at a lower amount of power, the number of hours between major overhaul will increase and it is not unreasonable to believe that this could readily become 1,000 hours at practical throttle setting, provided the total time for take-off and climb at full throttle is a small part of the total operating time. This is usually the case for the personal airplane used for personal or business flights. In this type of operation for a flight of three hours, the duration for take-off and climb is only about two per cent of the total running time.

For flight training operations, especially when the airplane is used for practicing take-off and landing maneuvers, the amount the engine is used at full throttle will be much greater. Added to this is the effect of long periods of operation in the climb at maximum engine temperatures, followed by periods of fairly rapid cooling during the gliding and landing. Consequently, much shorter periods between major overhaul will be expected.

This type of operation requires the best maintenance and service procedure to obtain the best service life and economical results from the engine. Service records indicate that those operators who (*Continued on page* 58)

Wilderness Air Lodge

Over 1,000 planes landed last year at the airport Art Otis carved out of the forest.

By GERALD B. SMITH

LIGHTPLANE PILOTS flying over the blue-green waters of Sugar Lake near Grand Rapids, Minn., suddenly catch sight of an unusual wilderness outpost. Below them is an airport, a lodge, a seaplane base, cottages and a golf course, all in a spot where nothing but forest might be expected.

The airfield, literally carved out of the Minnesota wilds, is "Wilderness Airport"—with three runways, the longest 3,000 feet. The field is run by resort-owner Art Otis, who has been plugging private flying ever since a barnstorming pilot landed on his meadow 20 years ago.

Almost 200 miles north of Minneapolis and St. Paul, the Otis Lodge development got underway before many a good-sized U. S. community even thought about providing an airplane landing strip.

Soon after that first pilot left, Otis started building a 3,000 foot north-south runway on his property.

Today, Otis Lodge is one of the best-known airmen's retreats in the north. It plays host to lightplane pilots who drop in from all over Minnesota, Wisconsin, Iowa, North and South Dakota, and even Montana. Over 1,000 planes, ranging from *Cubs* to DC-3's, landed at Otis airport last year. Three hundred planes and over 600 persons attended his annual breakfast flight last spring.

Now 55, Otis uses his two planes almost daily for both resort and personal business. In good weather he regularly flies his son John, 20, to college in Coleraine, 20 miles away by road. "It takes only about six minutes," says Otis, "and John has to walk only three blocks."

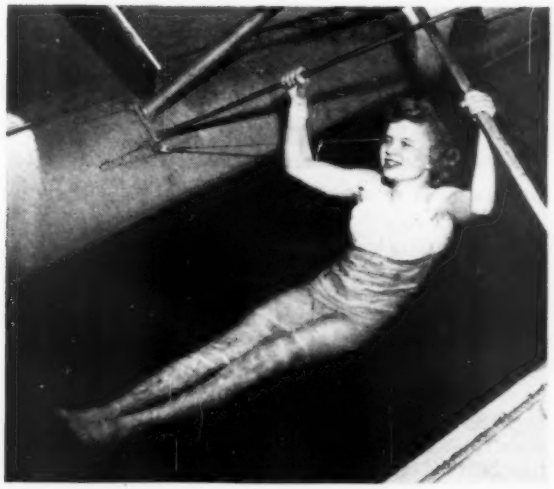
Rates at the Lodge are $10 per day, including meals, individual cottages, use of round bottom boats and golf. The resort airport, indicated on aeronautical charts of the region, also has 2,000 feet of sand beach. END

Meals at resort are included in $10 daily rate. The lodge and cottages can accommodate 60 guests.

Sugar Lake fishing is excellent, even near seaplane base. Waters contain prize-winning walleyes, great northern pike, black bass, crappie and sunfish.

Otis Air Lodge, 10 miles southwest of Grand Rapids, was jammed last spring when 300 planes and over 600 persons attended annual breakfast flight. Art Otis (inset) owns two planes, built his first airstrip after a barnstorming pilot landed on his pasture 20 years ago.

Nine-hole golf course with grass greens is located at end of a runway. Lodge also has croquet, horseshoe courts, children's playground.



"Water's fine, c'mon in." Elaine Carlson, Fergus Falls, Minn., swims from a floatplane at anchor in Sugar Lake.

REPORT FROM
WASHINGTON

The U. S. gets its assignment for defense of the North Atlantic region.

Our Job is the Atom Bomb

By RICHARD SAUNDERS

Washington Editor of FLYING

WHEN it comes to who does what—and who picks up the bill—the over-all strategy for defending the North Atlantic area is now plain.

Strategic bombing is the U. S. dish. If the Russians go on a rampage the U. S. will be expected to send its big heavies over to deliver the atomic bomb.

The U. S. Navy along with the British fleet has the job of keeping sea lanes free from marauding subs.

Upon Atlantic Pact signatory nations of western Europe falls the responsibility of supplying manpower for the hard core of ground resistance. They also will take care of ground support and tactical bombing phases of air power.

To help these countries build up their fighting forces the U. S. is expected to supply military equipment and materials under a new program to cost about $1,400,000,000 for the first year.

Joint chiefs of staff confer with Belgians in Paris to map North Atlantic strategy. U.S. representatives, standing left to right: Maj. Gen. A. M. Gruenther, director of U. S. joint staff; Gen. Omar Bradley, Army chief of staff and new permanent chairman of the joint staff; Gen. Hoyt Vandenberg, Air Force chief of staff; Adm. Louis Denfeld, Navy chief of staff. Seated are high-ranking officers of the Belgian Air Force, Army, Navy.

The Unanswered Question

But while the general outline is clear, few details have been revealed. How will the materiel be divided? Just what will be included—how many planes, tanks and guns and what types? Above all, how long will the program last?

For obvious reasons, the Defense High Command wants to keep the Kremlin plotters in the dark as to the U. S. blueprint for defense. Too, the foreign situation is subject to violent fluctuations. The Defense Chiefs themselves are not sure too many moves ahead.

It is possible, however, to fill in some of the blank spaces by piecing together scraps of information. For one thing, about half of the materiel will be supplied from reserve stocks in this country. The armed services will then replenish their reserves by using foreign aid funds to buy more modern equipment and supplies.

It means the U. S. armed forces will be selling part of their surplus stock at bargain-basement prices. Some Congressmen have squawked over this write-down feature. They contend it makes the program cost more than the quoted amount; that countries receiving the aid are getting $450,000,000 worth of goods for something like $75,000,000. Our military moguls shrug this one off. They say the surplus has already been "charged off."

Twenty Per Cent Aviation

Aviation, obviously, looms large in the program. According to one unofficial estimate, aircraft and radar will comprise 20 per cent of the aid. Most of these planes will be fighters, attack bombers and trainers—with a good sprinkling of liaison planes and transports.

Several countries have asked for DC-3's for transport use, including troop carrier missions. Since the Air Force does not have many of these old work-horses left, the airlines might be asked to sell some of their older transports.

Greece and Turkey (which are included under the program) want large numbers of lightplanes for liaison use. One report is that Greece has already purchased 200 lightplanes. In the case of both Greece and Turkey the program contemplates building up their air forces virtually from scratch.

Some skeptics argue that U. S. mothball reserves are obsolescent. To this the strategists make two replies:

They point out that U. S. airpower reserve components constitute the most modern equipment available anywhere in quantity. It is what the U. S. would have to use if it could not count on aid from western Europe and had to face an enemy alone.

Furthermore, they emphasize the psychological importance of sending military materiel to Europe as soon as possible. With the Red menace on their borders, some nations might lose the will to resist if they are forced to wait several years to build an even half-adequate defense force. They need planes now—and the only place they can get them is from U. S. reserve stocks.

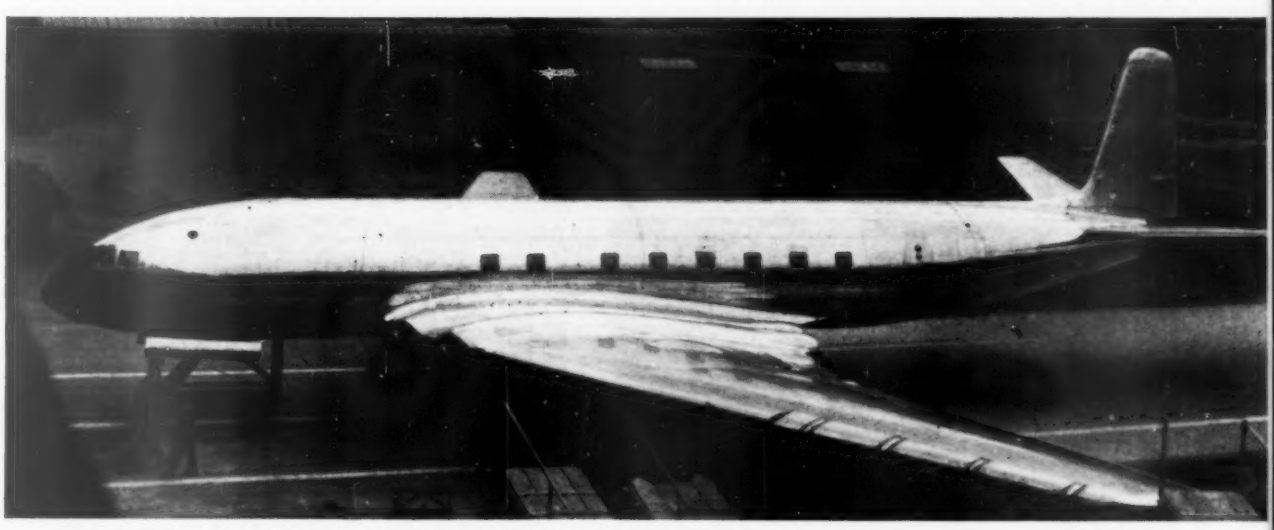
What if there are not enough (*Continued on page* 66)

HAVE YOU SEEN?

Four-place Canadian lightplane built by Found Brothers Aviation is powered by 145-h.p. Gipsy Major engine. Designated FBA-1A, it is constructed of fabric-covered steel and duralumin tubing. Span is 30 feet, length 25 feet, height nine feet. Gear is not retractable.

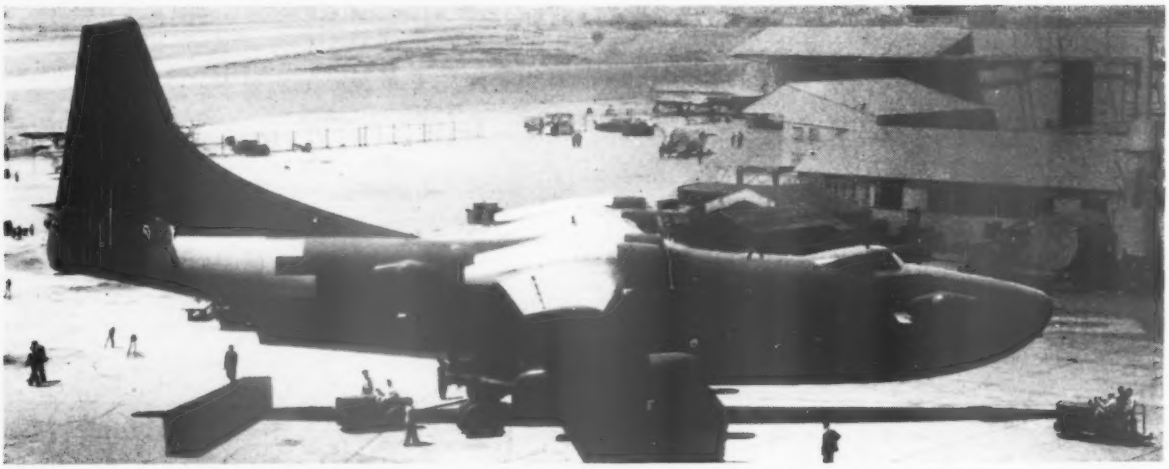
Fairchild F-47, one of three built, is used today for executive transportation by Ranger Aircraft Engine Corp. The plane is a four-placer.

All-metal Cessna 140 has semi-cantilever tapered wing and improved performance: 110 m.p.h. cruise and 125 m.p.h. top speed.



Jet transport, de Havilland Comet is 36-passenger, 100,000-pound commercial airliner expected to cruise 500 m.p.h. at 40,000 feet. Its four D.H. Ghost turbojets each have a static thrust of 4,450 pounds. Note small rudder, streamlined engine installations and long chord.

HAVE YOU SEEN? *continued*



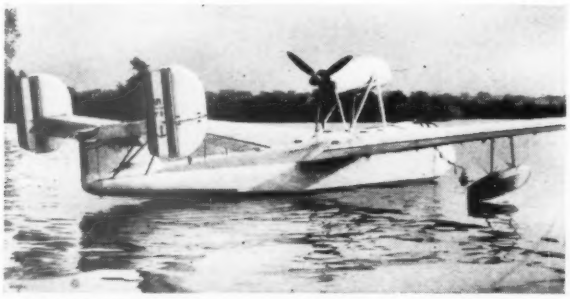
Sixty-ton Convair XP5Y-1 patrol flying boat nears completion at San Diego, with first flight scheduled this fall. Two are being built for Navy. Four Allison turbo-props will power the plane, which has a high length-beam ratio hull for superior hydrodynamic performance.

Versatile liaison plane, the Convair L-13 (shown skimming San Diego Bay in first water tests) can also be equipped with ski-wheels for snow operations, double-wheel landing gear for desert missions. A 245-h.p. Franklin engine enables high angle take-offs and landings.

Sud-Ouest Corse II (SO-95) is new French 10-13 passenger and freight transport. Cruise is 206 m.p.h. and range is 810 miles.

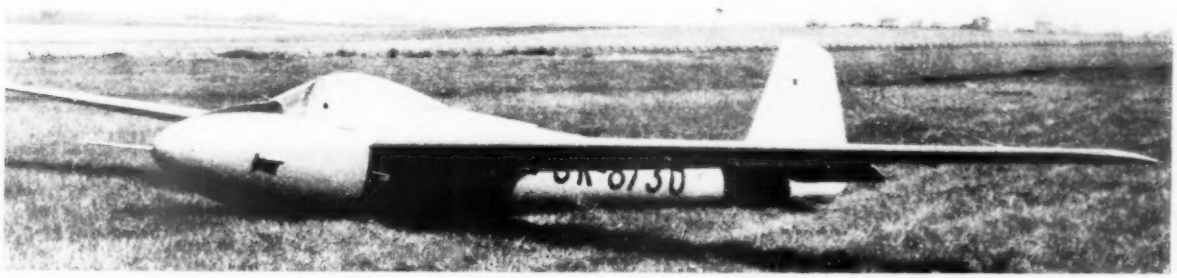
Nord Noratur 2100 is French 10-place transport with two 425-h.p. pushers. It cruises at 192 m.p.h. and has a range of 685 miles.

Czech four-placer, Bonzo M-3, is designed as personal plane, light transport or trainer. Construction is all-wood except for fabric-covered control surfaces. A 160-h.p. Walter Minor 6-III engine gives 165 m.p.h. top speed, 150 m.p.h. cruising speed and 620-mile range.



SCAN 20 is French flying boat with 325-h.p. Potez engine. Four-placer has dual controls for instruction of flying boat pilots.

Boisavia Mercury (B-60) is French four-placer powered by 140-h.p. Renault 4 engine. Cruise: 121 m.p.h. Top speed: 145 m.p.h.



Czech sailplane, Letov Lunak (L-107), is designed for aerobatic and long-distance, high-altitude performance. A single-seater, it has a gliding ratio of 1:24 at 50 m.p.h. Landing speed with flaps is 31 m.p.h. Span is 45.93 feet, length 21.82 feet, height 4.92 feet.

French trainer (MH-53) built by Avions Max Holste is two-placer with 140-h.p. Gypsy Major 10 engine. Cruise: 124 m.p.h.

Skaut M-2 is two-place Czech lightplane. It cruises at 102 m.p.h., has top speed of 115 m.p.h. on 75-h.p. Praga D engine.

I Learned About Flying From That! NO. 119

Foolhardy landing in Stearman cost author (inset) $1,100. He and passenger were uninjured, but plane was wrecked. Hopson is a well-known Western writer.

By WILLIAM HOPSON

An old barnstormer makes some new resolutions about flying.

DURING the lush barnstorming days from 1927 to the lean ones in 1931, when so many of us were starved out of the game, you could get away with a lot of things, including bad flying. We pulled asinine tricks like chasing farmers off tractors, buzzing plow teams in fields to cause runaways, causing panic among sheep and sheepherders, and stunting with passengers. I made 33 jumps with a homemade chute before the Department of Commerce inspectors caught up with me and said I'd better get myself some regulation equipment, including an auxiliary chute—or else.

Planes ranged from the homebuilt Heath with its Henderson motorcycle engine up to the old 90-h.p. OX-5's of World War I vintage. If you had an extra $1,000 or so you could get yourself some real power with a 180-h.p. Hisso job. If a Ryan five-place job of the kind Lindbergh flew to Paris in 1927 landed, we just stood around and gawked.

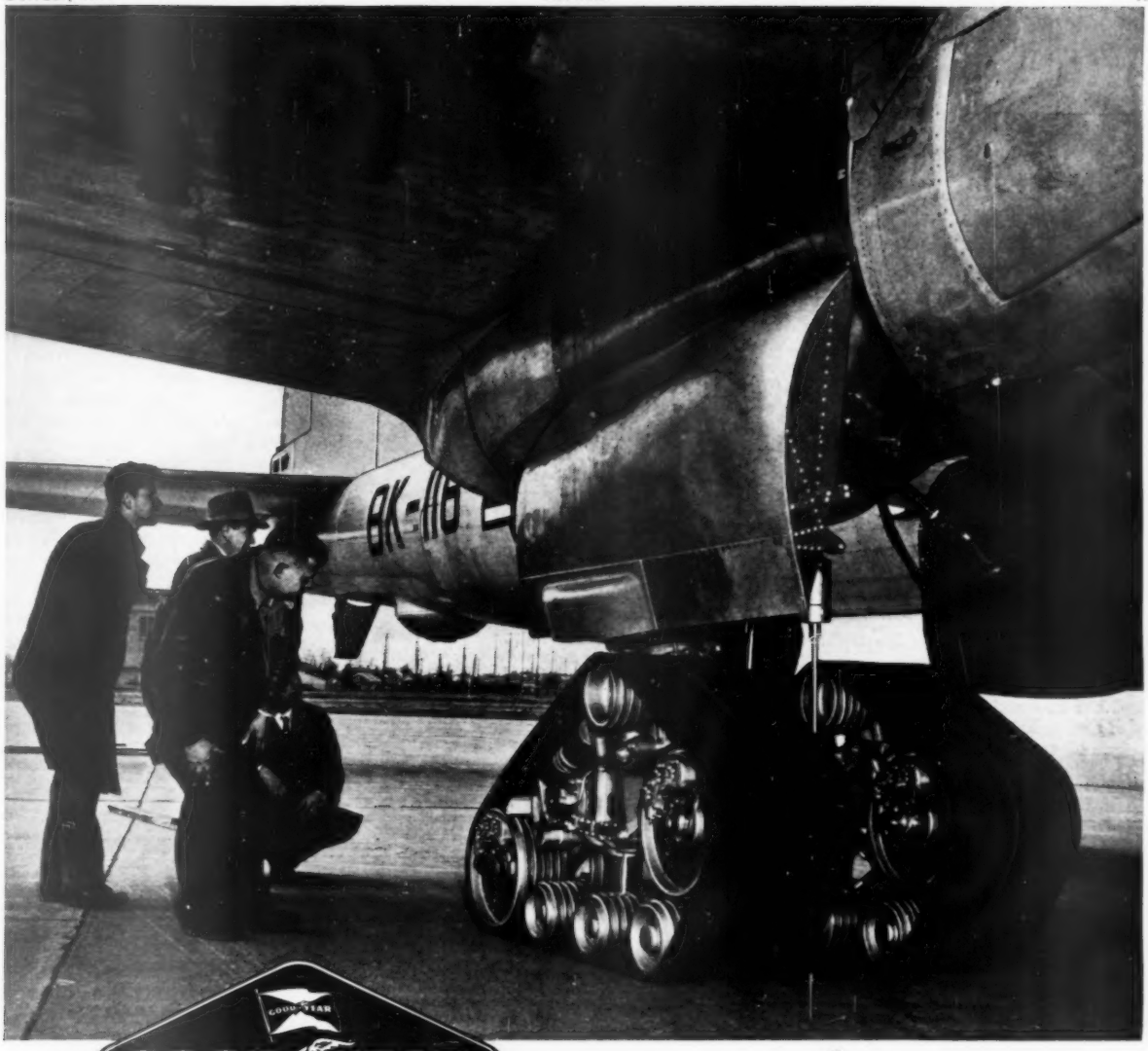
But those jobs from 35- to 90-h.p. were the average dish and some of them would stand a lot of poor flying because they were slow and stable. I recall a friend who got a little *too* careless one day, even for an old OX, doing whip stalls at 500 feet. He let one get away from him and spun in. He got out of the wreck and ran 100 yards with a broken ankle before he fell. The crash cost him his hearing. He spent two years building a Heath and on the first test hop got it about 60 feet in the air before it did a nose dive on him.

When he stepped out of the wreckage his hearing was completely restored! **That** could have been one for Ripley.

I flew my last plane in 1931, made my last jump that year for $8.30, and called it a day. Ever since the Wall Street crash in 1929 we had been living hand to mouth, sleeping on the ground by the plane because we didn't have hotel money, and offering farmers free rides if they'd give us some gas to go on to the next town. If they didn't, we came back that night and paid a visit to their tractors. I guess those who refused were remembering the runaway teams and the dives to get off tractors.

I didn't touch a stick for 15 years.

Then in 1946 I got the bug again and enrolled with a school on the GI Bill to learn the business all over again. I'll never forget that morning I took my first lesson. It was in an Aeronca and I got into the thing with the attitude you could expect from an old barnstormer. These puddle-jumpers! Phooey! These (*Continued on page* 50)



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AOPA NEWS

Aircraft Owners and Pilots Association is a service organization for the private pilot or aircraft owner. AOPA's full time staff is devoted to helping the individual pilot. Its aim is: "To make flying more useful, less expensive, safer and more fun."

Headquarters are: 15th and New York Aves., Washington 5, D. C. Members also receive a special AOPA edition of FLYING, newsletters and confidential aviation data. Opinions expressed in this column are not necessarily those of FLYING MAGAZINE.

FLYING FAMILY MOVES

AOPA recently received a request for routing from two of its members, Mr. and Mrs. Ross J. Barton of Champaign, Ill What made our staff sit up was the travel plan worked out by the Bartons to move their six-months-old child, automobile, and airplane to Thousand Oaks, Calif. One day Mr. Barton flew their Piper *Clipper* while Mrs. Barton drove the family car over the same route. The next day Mrs. Barton took over the flying and her husband did the driving. AOPA was glad to help them plan a route which provided suitable facilities for the baby, the airplane, and the car at the end of each day's trip.

RESORT AIRPORTS LISTED

AOPA's new resort airport list, on the presses at this writing, lists over 250 resort airports in the United States. This extensive listing was made possible with the help of AOPA members who reported and graded all airports they visited.

ITALIAN PLANE

AOPA member Silla M. H. Girardon of Milan, Italy, advises that the Macchi B-308 two-seater is one of the most popular Italian airplanes in production today. With a wing span of 33 feet and a gross weight of 1,320 lbs. the B-308 cruises at 106 m.p.h. List price f.a.f. in Italy is approximately $5,600.

MAP SERVICE

National headquarters received orders for over 2,000 maps the first week AOPA's new map service to members went into effect. And the orders are still rolling in! Sectional and World Aeronautical charts are available on subscription and any other Coast and Geodetic map may be ordered individually. AOPA fills the orders within 24 hours after they are received.

ADVISORY GROUP

Members of the Non-scheduled Flying Advisory Committee met in Washington recently to discuss current developments and problems affecting the private pilot.

AOPA's General Manager, J. B. Hartranft, Jr., serves on the committee with representatives from government (CAA) and industry (personal plane manufacturers).

Recommendations and resolutions passed by the committee included:

1. That CAA run flight tests on popular light trainers to determine what spin improvements could be made by restriction of controls. If the tests reveal reasonable improvement, CAA and the manufacturers will work together to prepare kits and bulletins for the airplanes involved.

2. That single strip airports receive more federal aid. One way is to permit CAA to sponsor up to 50 per cent of the land costs of an airport instead of the present 25 per cent.

3. That any air space restrictions over areas where hazards to air traffic do not exist be strongly opposed—in particular, the Quetico-Superior National Forest area.

4. That the Administrator use his contacts with CAB toward allowing an operator to fly a shuttle service on schedule in areas not serviced by certificated airlines. These shuttle lines would be for an experimental period, would not require the usual economic route certification, and would be for short range (150 miles) only.

As additional safety measures the committee urged wider distribution of CAB safety bulletins and CAA promotion of flight plans.

Next meeting of the committee is scheduled sometime in October.

FOREIGN FLIGHTS

AOPA's mushrooming foreign flight department is now processing foreign flights for 50 to 70 members a week. Members flying to Buenos Aires are routed, visaed, passported, and checked out on Brazilian airports and native customs before they leave the United States. Trips to Fairbanks, Alaska; Lima, Peru; or any point in between are handled with similar dispatch by the AOPA foreign flight staff.

FIRE FIGHTERS

Continuous study of methods to provide safety from fires in the air is a major project of the CAA program at its Technical Development Center, Indianapolis, Ind.

Baggage compartment fires are under study as well as those which originate in other sections of the airplane.

One project in progress for the past two years is the search for a non-inflammable lubricating oil. Dozens of commercial companies are helping in this research.

Members of the Non-Scheduled Flying Advisory Committee met in Washington recently to discuss current problems and developments affecting private pilots. (See above item.) Standing, left to right, are Leighton Collins, Lynn Bollinger, Harold F. Wood, George E. Haddaway, Oliver L. Parks. Seated, left to right, are Edward B. Williamson, J. B. Hartranft, Jr., Otto C. Koppen, Don C. Flower and Delos W. Rentzel.

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THE LIBRARY

FLIGHT INTO HISTORY: THE WRIGHT BROTHERS AND THE AIR AGE, by Elsbeth E. Freudenthal. Published by University of Oklahoma Press, Norman, Okla. 268 pages. Price $3.75.

A passion for exact accuracy was a characteristic shared by both of the Wright Brothers. Doubtless it contributed much to their success in developing the first successful man-carrying powered airplane.

In later years this love of the precise was to cause Orville Wright much mental anguish as he had occasion to review various mis-statements of aeronautical history. Among other things, it caused him to bring the Wright-Smithsonian Institution controversy out in the open by sending the Wright Flyer to England. It was probably the one force above all else that would rouse him from his quiet seclusion to make sharp and forceful correction of the error.

So it is probably a good thing for Elsbeth E. Freudenthal that she waited until after Orville Wright's death to bring forth her recent book, "Flight Into History." But it does not seem a good thing, to this reviewer, to allow the book to go uncontradicted.

Multiplicity of footnote citations to Dr. Albert Zahm in the book establishes rather clearly that the writer has depended heavily on the considerably biased writings and statements of the former head of the Library of Congress aeronautics division. It will be recalled that Dr. Zahm worked with Glenn Curtiss in the remodelling of the Langley Aerodrome to make possible Curtiss' 1914 flights. It was on Zahm's report to the Smithsonian that were based the claims later repudiated by the Institution. And it was Dr. Zahm who worked as Curtiss' expert witness in the Wright-Curtiss patent litigation, doing extensive research into other early flight attempts in an effort to find one that would disprove the Wrights' claim of priority.

Miss Freudenthal has culled extensively from other early writings about aeronautics, both in newspapers and in books. As a result, her book has inherited many of the errata in these early writings and she has added a few new ones, apparently all her own.

There are simple careless errors like miscalling the name of Johnny Moore, the barefoot boy witness to the first power plane flights at Kitty Hawk "John Ward."

And there are complex mis-interpretations of the position of the Wright Brothers in respect to Octave Chanute, from whose letters she draws considerable material. She takes the view that the Wrights owed much of their success to Chanute. Actually a study of Chanute's work shows that the old bridge builder made better bridges than he did gliders, and that his contribution to the Wrights was almost wholly inspirational.

The one-sided Zahm influence seems to have colored Miss Freudenthal's references to the Wright-Smithsonian controversy unduly.

And finally she winds up her book with a hasty caricature of Orville Wright in his later years which has little actual resemblance to the man as he was, sharp-witted, still seeking and inventing, occasionally stingingly sarcastic, and more often kindly and generous.

Miss Freudenthal apparently drew little from one of the other references she cites: "The Wright Brothers," by Fred C. Kelly. This book, approved by Orville Wright after painstaking revisions from his original records, was published in 1943 and remains the most authentic book on the subject.

—ALEXANDER MCSURELY

THE ARMY AIR FORCES IN WORLD WAR II. Volume Two. Europe: Torch to Point-blank, August, 1942 to December, 1943. Prepared under the editorship of Wesley Frank Craven and James Lea Cate by the Air Historical Group, United States Air Force. Published by University of Chicago Press, 5750 Ellis Ave., Chicago 37, Ill. 897 pages. Price $6.

This book is the second volume in a seven-volume history of the United States Army Air Forces in the Second World War. The first volume (reviewed in the August, 1948, issue of FLYING), published in 1948, covered plans and operations against the Axis Powers from January 1939 to August 1942. The present volume is devoted to the early phases ot the air war against the European partners of the Axis Alliance, in North Africa, Sicily, Italy and over Germany and Nazi-occupied countries.

Operations by the American Air Force in England against *Festung Europa* did not begin until the Rouen mission in August 1943, and finally grew into Operations Pointblank, the Combined Bomber Offensive.

Meanwhile, development of the Eighth Air Force, based in England under command of Maj. Gen. Carl Spaatz, was delayed by the need for sending new forces from the United States to meet the Japanese advance in the Pacific and to North Africa to co-operate with the ground forces in Operations Torch. The present volume covers the AAF's operations in both the Mediterranean and European theaters. It ends its account of the AAF in the Mediterranean theater with the Allied invasion of Italy temporarily slowed down by the stubborn German defense in December 1943, while the Eighth Air Force in England was preparing to follow its assaults on the interior of Germany with vigorous execution of Operations Pointblank. The third volume in the series will continue the history of the air war in Europe to VE-Day.

The editors and authors have adopted the point of view of the AAF commanders and their staffs. This is a wise procedure, inasmuch as the time has not yet come for a definitively critical appraisal of military operations in the Second World War. The captured German records remain to be fully studied. Under agreements made by the Combined Chiefs of Staff, the United States retained the records of the German ground forces while Great Britain received the files of the *Luftwaffe*. The historical section of the British Air Ministry has not yet been able to process these documents for complete investigation. Thus, in spite of the fact that the editors and authors of the present volume have had some access to German documents, a considerable part of the story of air warfare in the Second World War still remains to be told from British, German and Italian sources.

The present volume presents a logical account of the organization and operations of the Ninth Air Force in Egypt and of the 12th Air Force all the way from Casablanca to Salerno. The volume also contains an account of the development of the 15th Air Force as a strategic air force to assist in the Combined Bomber Offensive against Germany, while the 12th Air Force remained as the tactical air force in the Italian campaign.

One of the most significant parts of the volume is the detailed analysis of daylight precision bombing of German targets by the Eighth Air Force. High altitude bombing was one of the great American contributions to war strategy. The British Royal Air Force, which had accomplished wonders in the way of low altitude night bombing, quite correctly was skeptical of the revolutionary American plan for daylight bombing at altitudes of 22,000 to 26,000 feet. By September 6, 1942, however, after 10 bombing missions against German targets in France and Holland, the RAF was convinced of the efficacy of the American strategy and gave the AAF generous support.

The editors and authors analyze with considerable acumen the claims of the AAF for the destruction of enemy aircraft. That these claims were greatly exaggerated has long been admitted. The psychological and statistical problems involved in estimating enemy losses are admirably discussed. Indeed, throughout the volume, the competence and intellectual honesty of editors and authors is always apparent. The two volumes already published offer an accurate and scientific treatment of organization, operation, tactics and strategy. They constitute an outstanding contribution not only to the history of World War II but also to the general literature on aviation. In the opinion of the reviewer the footnotes should have been placed at the bottom of the pages of the text instead of being relegated to the appendix. But this is a device that may appeal to the general reader. There is a convenient index, a glossary of abbreviations and several organizational charts, as well as numerous maps and illustrations. Of value is the tabulated analysis of the 171 missions of the Eighth Air Force heavy bombers.

—KENNETH COLEGROVE
Northwestern University

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LOGGING TIME

WITH HY SHERIDAN

Captain, American Airlines

THE CAA INSPECTORHOOD

The one thing about people that we can depend upon is that they vary. Take the CAA inspectors. Adding them up they are—how I hate to say this—an upstanding bunch of men, a statement which does not include, of course, the down-sitting officials of this bureau of the many well-filled drawers.

The inspectors have a very tough job indeed. Whatever you may have gotten as an impression, they do not wish to hobble you, swaddle you, or in any way denature you. On the contrary, they want you to express yourself, but they also want to do what they can to keep you as a going member of the American taxpayers, two objectives that are by no means easy to reconcile in practice. In other words they want you to express yourself on earth but not to heaven.

This simple little idea, like the invention of two sexes, can lead into the most surprising complications. The inspector must somehow satisfy the pilots, the politicians, the industrial privateers, and the columnists, not to speak of the great American public.

Of course, in view of the above, why a man should want to be a CAA inspector is not a proper subject for this story, although the thing must have lively interest. Why an animal wants to be a hippopotamus is quite beyond me, but some of them do. We must face the facts.

The wonder then is that the CAA inspectors in the field add up so well. On the whole they are considerate, thoughtful, friendly, understanding, and possessed of as much intelligence as is good for them. However, human nature being what it is, we are bound to find a number of somewhat human beings who vary from the norm. This is true also of the CAA, a very few of whose inspectors are ample proof of the fallacy that nature abhors a vacuum.

Now and then we encounter a CAA inspector who only knows as much about aviation as he learned in a Washington cocktail and remount station. When he sees a fine pilot he is dined upon by envy, or at least that's the way it looks to some of the flyers who have met up with same.

The strange thing is that the CAA doesn't seem to have many in-between types. They are mostly very good and the rest—dear, dear. I am tempted to use the words of my illustrious ancestor, Richard Brinsley Sheridan, who once said of a critic "All he has is ignorance. And very little of that."

The most recent episode had as its principal actor a short-fused suspector on the Pacific Coast who flew a sniff trip with an old-time and rather famous pilot. Not understanding very well what had gone on during the flight, the inspector needed more time, so he grounded the pilot. The following is a report of the conversation of the man with his superiors.

Inspector. *Well, I put him on the ground.*

Bureaucrat. *What for?*

Inspector. *He needs a little more practice.*

Let's see, there's something I'm leaving out. Oh, yes. The pilot who needed a little more practice had, at that time, something over 19,000 hours of flight.

Well, dear reader, as you have suspected, there are lots of nuts that are not threaded.

P. S. The pilot in question was ungrounded the day that his senator suggested that he would like to witness comparative flight tests of the inspectors in that area and the pilots they were passing upon. Or so the story goes.

* * *

SHORT STOP

The airliners often carry baseball players these days because the speed of air travel gives them a chance for practice and rest too, between games. One day Sadie the Stewardess chanced to talk to one of them who was aboard, a rather handsome and certainly a durable looking fellow. Excitedly she came to the cockpit to tell the flight crew about her thrilling experience.

"What position does he play, short stop?" the co-pilot asked.

"I don't know," she replied, "but it couldn't be short stop. He's too tall for that."

* * *

Sadie wouldn't care much for being an official either in an airline or in a Government office. You run to fat at both ends. "The job is so sedimentary," she says.

I Learned About...

(*Continued from page* 44)

guys should have seen the old Hisso *Eaglerocks* we used to fly. *There* was an airplane.

I'd already told the instructor that I was an old timer at the business and, secretly, I was pretty certain that I could still cut the buck after 15 years. He briefed me on the cockpit setup, got in, closed the door, and trundled it down to the end of the runway.

"All right," he said. "Just gun her and take her off."

I gunned her and started to take off. Right then I made the sickening discovery that there was a lot of difference between the old loosely-rigged rudders we used to fly and these tightly-rigged larger ones. I whipped from one side to the other for half the length of the runway trying to neutralize—but it was no go. And that instructor just sat back there and let her rock all over the field. He cut the gun just as I ground looped. I sat there, looking down 1,500 feet of runway with what must have been a very foolish expression on my face.

I got even with him by soloing that Aeronca after just 30 minutes of landings and take-offs. I suppose he felt sorry for my deflated ego.

I put in a lot of time on the light jobs with their little 65-h.p. engines, getting very impatient with some patient instructors. It irked me to watch the way they so carefully checked a plane before flight and then spent what seemed to be hours warming up an engine before take-off. In the old days we just crawled in, gunned the engine, and kept on going. Another thing that irked me was the fact that after 45 hours of dual instruction and about 75 solo they still had me up there doing more stalls and spins and 720's.

It was only after I threatened to leave the school that I got the private certificate. "It wouldn't have hurt you a bit to have waited another week," the instructor, a former *Mustang* pilot, said. "You have a tendency to get a bit careless and I wanted to work it out of you before turning you loose with passengers."

I walked off with a snort of derision. I was getting pretty well fed up with flying powered kites and all this being careful business, plus having to obey so many new regulations. I told them all so—and that I was going to buy myself a plane like we flew in the old days. A week later I had it—a Boeing-built Stearman.

I had been warned, previous to delivery, by everybody from the instructors to the hangar rats—that's what we called them in the old days—that my new plane was a vicious ground looper and that I'd need hours and hours of dual instruction before I could safely solo it. After that first and unforgettable experience with the Aeronca's sensitive rudder, they all had me just a little bit scared.

So I hired an instructor and began shooting landings with the tail wheel locked. No ground loops. She mushed in just like an old OX-5 *Swallow*. I shot some final landings the second time up

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and the instructor said, "That's fine. Another week or two of work and I'll let you solo her."

I could feel the resentment boil up inside me. They had made me take 45 hours of dual on puddle jumpers to get a private certificate. Now the guy was telling *me* when he'd let me take up my *own* plane! The more I thought about it the madder I got. Another week or two, eh? That's what *they* thought!

Twenty minutes later I was back at the field telling the mechanic to swing the prop on the still warm motor.

He looked at me aghast. "You're not going to solo her, are you?"

"I've walked away from a couple of crack-ups in the old days," I told him. "And if I crack this one up I'll go right back and buy another one. Wind her up."

He shrugged and waited until I was in the cockpit, bareheaded and without goggles. Then he swung the prop and I taxied straight down to the end of the runway and, without bothering to rev up the engine, took off. She didn't conk and I shot four perfect landings, flew around for a half hour, and came on back for another perfect landing.

For the next week I was a pretty hard guy to get along with. I was up every morning and afternoon, bareheaded and without goggles, cutting capers around the field sans a chute, and gradually slipping back into the old habits.

I never inspected the plane, didn't bother to warm it up, did snap rolls at 2,000 feet when I should have been up 4,000, and often flew in after dark with no lights on the plane or field. One night when I made an approach in pitch blackness at about 10 o'clock I thought the runway looked pretty bright.

It was. When I dropped down to make a landing, I discovered the "runway" was the broad stretch of the Colorado River alongside the field. Twenty feet lower and I'd have been killed in a river crash landing.

Just a week later the inevitable happened. I crashed the plane.

It happened like this: Twenty-five miles below town lay the Mexican border with its customs house right on the line. Back of the customs house was a small field too sandy for most lightplanes but just right for a Stearman with a 220 Continental and with big tires. So it got to be a habit to fly down late every afternoon, pull up in back of the customs house, and walk 75 yards across the border to drink a Mexican beer.

On this particular afternoon I asked Ernesto Muñoz, a Mexican-American pianist in a night club, to come along. There was a pretty good ground wind blowing and when I dropped down to land it was a tail wind. I eased in at 60 knots and waited for the ship to stall out at 45. And this time the plane simply refused to land. She floated in like a paper in the breeze.

With little field to spare I gunned and went around again and made another try. Normally I'd have gone around and landed into the wind. But that would have meant flying over the Mexican border against regulations of both Governments and also dropping in over the housetops and main street of the little town. So I landed her down wind instead of going on back to the home field as a careful pilot would have done.

But not an old barnstormer like me. Nosirree! I was going to put that plane into the field come hell or high water, and I wasn't going to do it on a third try. She was going in whether she wanted to or not.

I shoved down on the controls and made a two-wheel landing. I saw too late that that stubbornness had got me into trouble. I didn't have enough runway left. And, right at the end of that one, back of the International Boundary, stood about 50 Mexicans quite unaware of the impending danger.

That meant three choices. I could rudder aside and hit the fence and plow through into the streets of the town—and perhaps cause an international incident. I could ground loop and maybe get a wing. Or I could try braking her to a stop. I knew those big tires would take plenty from the brakes. So I let her roll straight ahead and socked the hydraulics to the floor.

That was about the silliest thing a pilot could have done. On hard ground it might have worked. But I had forgotten that in soft sand when you apply the brakes too hard it builds up in front of the tires. We hadn't gone 40 feet until it felt as though there were a couple of sand bags tied to the wheels. There was that first sickening sensation as the nose went down and we started over on our back. The left wing hit first, then rocked over as the right wing dug in, and then there was a terrific crash as we went over and the rudder smashed into the ground.

We hung there upside down by our belts while I yelled back to ask Ernie if he was hurt. He wasn't.

"Then get out quick and let her burn," I shouted and jerked my belt free.

We scrambled out into the clear and when no fire broke out crawled underneath to cut the switches and turn off the gas. Fifty or 60 Mexicans had come running across the line to cluster around. With their aid I pushed the plane over on its nose and back upright once more. It didn't look too badly damaged and I figured not more than $100 for repair.

Next day the mechanics informed me that I had cracked the spars in three of the wings and center section, smashed the rudder, and broken the prop. All it would cost to repair was $850.

I had paid $1,200 for the plane because it was an extra good one. I sold it to some crop dusters for spare parts for $100.

It cost me just $1,100 that afternoon because I was determined to land a plane under unfavorable conditions instead of returning to the home field.

That's the third one I've walked away from. There won't be a fourth. My friends say I'm a regular old woman about flying these days; careful checkups daily, careful warm up, careful take-offs, and when conditions are not right I leave her tied down on the ground, where she belongs. END

"It's about the only time we get any fresh air!"

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The most thrilling airview in the world—Greater Manhattan—is only one of the fine services offered by the Cater-White Seaplane Base located at Hudson River and Dyckman Street. This ideally situated seaplane base is alertly managed and fully equipped. In addition to the vastly popular aerial sightseeing trips, the Cater-White Seaplane Base offers charter service, student instruction, hangar space and, of course, a complete line of top quality Cities Service aviation products.

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On a Slow Rope

(*Continued from page 27*)

The capital crime for a glider pilot was undershooting. He didn't have a throttle or a second pass at the field. Consequently, we all learned to save plenty of altitude for the final approach and then to lose altitude quickly by violent slips.

Control surfaces were large and had a lot of feel. This permitted slow glides and exceptionally good ground control. With a full combat load of nearly 4,000 pounds, we could glide as slow as 55 m.p.h. Once on the ground, if our locked brakes were unable to halt our run, we could dig in the nose skids or in case of emergency, steer between two trees and stop by some fancy wing smashing. Gliders in combat were expendable and designed for a one-way ticket. We didn't have the "save the ship" complex so prevalent among our powered brothers. We also had the big consolation of not having to worry about fire. The absence of 100 octane gas was strictly a pleasure.

Most of us felt safer in a glider than riding in a C-47. We used to pity the other services—such as the bomber pilots with their tons of explosives, gasoline, high landing speeds and English fogs. We were trained to land any place, any time—day or night. Nearly every glider pilot I knew could roll his ship into a 50-foot circle from any altitude or direction.

Wrapped around the tow-rope and festooned to allow for the stretch of the nylon, was a telephone cable for direct contact with the "office" of the C-47. Lieutenant Kuna was talking as I placed the phones over my ears. It was the first time we had used such a system and Kuna and I were both dubious about its efficiency. It seemed to be working and we nervously chatted until he interrupted with a terse, "Here we go—good luck!"

From my position, I could see the C-47's leaving their positions one by one—and the gliders, finely balanced on their wheels, lifting their tails high into the air as the drag of the ropes took effect. The glider pilots by violent brake action used an angle pull of the rope to get off the sod onto the runway. Then by brake and rudder, they aligned their ships behind the tow plane for the take-off run.

My turn arrived and I fought the controls and brakes getting into position. CG-4A's became airborne between 65 and 70 m.p.h. and we immediately climbed above the pulsating prop-wash of the tow to a high position where we could watch the C-47s and make an emergency release if the runway gave out before they became airborne. They always made it, though many times my rope sagged into the trees at the end of a field as my hand searched for the release lever.

From our high position, we could see the C-47 hoist its tail and break loose. At this point I dived towards his tail to reduce his drag. From then on, it was a matter of anticipating his moves and turning, climbing or diving after his tail as he fought his way into the formation.

Within five minutes, we were in formation and the long column of fours was bearing due east. Each element flew slightly higher than the one ahead in order to get into smooth air and avoid prop-wash. I trimmed the glider and settled down for the long drag to central Holland. The wind beat against the broad, flat windshield and drummed the fabric, setting up a familiar howl which told my conditioned ears we were traveling at the prescribed 120-m.p.h. speed.

My forgotten passengers were all bearing up well, in fact there were several encouraging smiles. I beckoned Corporal Kjellander to the empty co-pilot's seat, according to prearranged instructions, and attempted to show him the fundamentals of flying—just in case I became a casualty. It was a waste of time because we were in too tight a formation and I couldn't let him have the controls long enough to get the feel. A tow rope on one side and a glider bouncing up and down on the other, kept me nervously grabbing the wheel. Consequently, I asked him to keep his eye peeled for anything out of the ordinary—such as strange aircraft. I still shudder to think what would have happened if one of "Hoiman's *Luftwaffe* Boys" had been on the prowl. No defensive weapons, no chutes, just big fat waddling targets. However, our fighters had cleaned the air during the previous days and evidently they had used a big, new broom.

Over the channel, the air was velvet smooth and I had plenty of leisure to talk with my passengers. Private Rais was sitting directly behind me on one of the plywood benches running fore and aft in the cabin. He had my helmet and flak suit all ready to place over my head and shoulders in case of an attack. This equipment was too heavy to wear while flying the violent maneuvers of take-off. The boys were all very concerned with my health—and I could see their point. I told Rais I had better "make like a knight" as soon as we crossed the Holland coastline. He agreed.

The German-held continent loomed on the horizon after about 20 minutes. Within minutes we were able to discern buildings and other signs of habitation, then the white line of breakers swept by 1,000 feet below. We watched the ground with interest, knowing we were over enemy territory. Below were vast flooded areas with small islands of high ground. I gulped at the thought of a forced landing.

About five miles inland, a few streaks of tracers made long arching lines across the bow of my ship. Frantically, I searched the sky for an enemy fighter but couldn't see one in the sky. Rais had started to help me on with my armor when Kjellander pounded my shoulder and pointing at a jet-black "orchard" of anti-aircraft bursts at 5,000 feet and one mile ahead. I yelped at the boys to break out a first-aid kit and tourniquets, just in case. Then I tried to suck myself up into my helmet like a turtle.

The Germans had been firing at high and fast fighters or bombers, and slow speed and low altitude had them momentarily confused. Nevertheless, they were making rapid adjustments and we could see the flak bursting lower and closer, looking like gigantic terraces of black trees. They zeroed in at the same time our lead wave arrived over the guns. One glider disintegrated and plunged earthward, killing Flight Officer Reese Hill and his entire crew. A C-47 nosed into a steep glide with one engine trailing a long black plume of smoke and flame. Its glider, piloted by Flight Officer Dale Curtiss, released in time, pulled up and out of the way of the following armada and landed without mishap. We learned later that with the aid of the underground, the entire crew managed to

15 YEARS AGO

FROM the October, 1934, issue of this magazine:

The Breda "25," a two-seat trainer and sportplane, was produced in Italy. With a 220 h.p. Romeo *Lynx* engine, the biplane had a top speed of 127 m.p.h., cruised at 99 m.p.h. and landed at 43 m.p.h.

Arthur Brisbane stated that Germany's air industry could turn out 2,000 planes every four weeks.

Free airline passes were "virtually abolished" by an amendment to the fair practice clause in the air transport code.

First Women's National Airmeet, sponsored by the Women's National Aeronautical Association and the Ninety-Nines, was held in Dayton, O., in August. Pilot Francis Marsalis (who set a woman's endurance record of nine days, 21 hrs., 42 min. in December, 1933) was killed at the meet when her plane crashed.

Welch Airplanes of Portland, Ind., after three years of research and experimental flying, put their two-seater

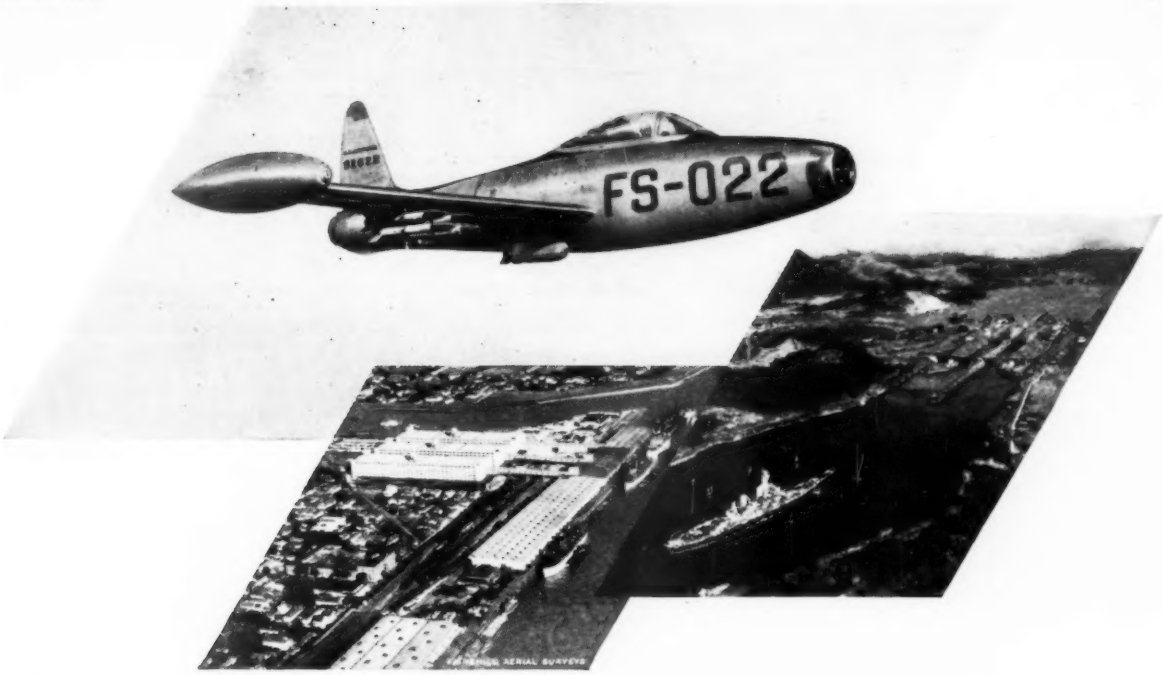
on the market. Welch developed its own 45 h.p. engine to make it possible for the plane to retail under $1,000.

Henry Ford stated he could build a 100-h.p. lightplane engine, weighing approximately two pounds per horsepower, for $95. (This price was based on a guaranteed order of 10,000 engines.) Mr. Ford intimated he would need only a few weeks to get his shops, tools and dies ready for production.

Sign of the Times. This advertisement appeared in the classified section: "Young man, 24, will fly for two years for $30 a month and board for anyone who will finance me through a transport pilot's course."

TWENTY YEARS AGO

Grover Loening described as "most prominent not only in aeronautical circles but in New York social circles as well," was flying his own planes, a DeHavilland *Moth* and a Curtiss *Robin*.



THUNDERJETS OVER AMERICA

Way down yonder . . . high above cotton fields and tobacco lands . . . more F-84's are going into active service daily . . . broadening the protective scope of our U.S. Air Force patrols. ¶ Two new models of the

Thunderjet . . . the F-84-D . . . and the F-84-E . . . have been added to the Air Force's fighter arm . . . bringing even greater performance in speed, range and altitude for air defense . . . and for quick retaliation in case of need. ¶ Not just an interceptor nor an escort fighter . . . but also a deadly fighter-bomber, carrying two thousand pounds of bombs, high velocity rockets, depth charges or incendiaries . . .

in addition to a FULL load of fuel for any required mission . . . this is the THUNDERJET. ¶ Today, F-84's protect the vast Southern waterfront with its inland cities and farmlands . . . just as they are assigned to help guard our East and West Coasts and Northern boundaries. Proficiency of pilots and planes alike is kept razor sharp by

frequent maneuvers . . . highlighting the tactical requirements of independent air operations, as well as performing vitally important close support assistance to Army Ground Force troops. . . . . Republic Aviation Corporation, Farmingdale, L. I., New York

"This is the year of the Thunderjet"

REPUBLIC AVIATION

Makers of the Mighty Thunderbolt · Thunderjet · XR-12 · XF-91

reach the Allied lines to the south. The crew of the C-47 survived the crash landing and was captured. After a series of unbelievable adventures, they managed to escape and return to England. One officer was lost.

The next concentrated burst exploded directly behind my wave in the interval between elements. Concussion shook the glider, and chunks of shrapnel whined through the air and fabric. Control was completely lost for several seconds.

I came out of a momentary trance to find my tow plane in violent evasive action. He was in a slight dive, zigzagging, and our air speed was up to around 175 m.p.h. The wings didn't respond to the ailerons, and several times it looked as though the only answer was to cut off and go down.

Slowly, however, our element returned to normal flight, speed and control. I could hear Lieutenant Kuna talking over the phone system and with great difficulty received his request for a casualty report. I looked around the cabin and—although the cheerful grins were missing—everyone looked alive and as happy as possible under the circumstances.

Lieutenant Kuna then tried to notify me that we were over the drop zone. Instead of listening to his instructions, I looked for the usual release signal, a green light from a biscuit gun in the astro-dome of the C-47. But we had our wires crossed—and all the time we were traveling deeper into enemy territory. The loss of two gliders in the flak barrage had placed me in a lead position. Approximately 16 gliders were waiting to follow me down into the assigned field. And I was merrily leading about 60 men to Berlin. Kuna, tired of waiting for me to obey his phoned instructions, did the only possible thing and cut me off the tow, saving my life as well as the lives of all the personnel following my lead. I dove down and out of the way of the following tow planes and frantically searched for a landing area. We didn't know it then, but we were nearly 40 miles away from our assigned field and deep into Nazi territory.

Spotting a likely field, I slowed my glider to a normal 75 m.p.h. When I started my approach pattern, a machine gun opened fire on us from 500 feet below. I had one overwhelming desire: to get that glider on the ground and dig a big deep hole. I tossed away all the rules and tried to dive my pattern. The fence at the far end of the field approached so fast I could do nothing but pull up and over this obstruction. This, in turn, forced me to hurdle some trees, then a house. Momentarily expecting a stall, I finally spotted another field and leveled off. I still had nearly 100 m.p.h. air speed. This time, I played it the way I had been taught and we rolled to a stop as though we were on the runway back in England. Then I sat and shook.

A small, neat hole, appearing suddenly in the cabin fabric and punctuated with a loud snap, crystallized our thoughts and actions. Within 30 seconds we were 50 yards away from the glider, digging in at the base of a large earthen mound packed with beets.

Thus ended our ride to Holland. The senior member of the crew, Corporal Kjellander, was now in command and he did an excellent job of scouting and organizing our small party until it made contact with the main body in the shelter of a stone farmhouse. Private Rais had been slightly wounded during the landing but ignored his wound and marched all night as we hit the road to get back to the division command post. The Airborne troops were first class field soldiers. We arrived at our designated drop zone the next noon without losing a man. In fact, during the march, we picked up 17 prisoners.

How long ago it all seems. The fear and fatigue are long forgotten and the participants are scattered all over the world. But the fraternity of motorless morons, as we were so often called, is a binding organization. You spot a pair of "G"-centered wings and off you go on some fantastic flight—full of new CG-4A tricks. Most of us feel like survivors of the famous Light Brigade and we can hold our own when it is necessary to brag. END

EMERGENCY TAKE-OFF

A JATO-EQUIPPED C-47 made frontpage headlines last December when it rescued 12 Air Force men who had crashed-landed in Greenland.

Only 20 days prior to that spectacular flight, the same C-47 was the first plane of its size ever to use JATO under emergency conditions.

While on a routine flight, one of the plane's engines quit and the pilot made a wheels-down forced landing in an Illinois wheatfield. The only damage was a nicked wing.

The job of salvaging the plane was turned over to Capt. George Last, aircraft shops officer at nearby Chanute Air Base. It was a ticklish problem. The field, only 1 200 feet long (the C-47 needs 4 500 feet for take-off under normal conditions), was soft and muddy from recent rains.

Captain Last had three choices. He could dismantle the $100 000 plane and take it away in pieces. He could chop down some trees and pay the farmer for making a runway out of his field, or he could take a chance with a jet-assisted take-off.

The first two methods were time-consuming and expensive, so Captain Last decided to use JATO, although he knew of no actual incident where a big plane had used this recent development under similar emergency conditions.

A call was put in for Capt. James Doolittle, Jr., son of the famous general, who had made a number of experimental jet-assisted take-offs.

After repairs were completed, two

150-pound jet tanks were hung beneath the fuselage. In above photo, Doolittle (left) and Last are inspecting jet tanks.

On a trial run, the airspeed built up to only 45 m.p.h. when Doolittle had to chop the throttles to keep from tearing into a fence. The big wheels dug into the soft mud, making giant ruts. Doolittle decided he couldn't experiment any longer without ruining the field for take off.

The next run would prove what JATO could do. Again the plane moved forward sluggishly. After 200 feet, Doolittle flicked the JATO switch. Exactly two seconds later the plane was sucked from the mire and shot up at a 45° angle. Doolittle, amazed at the speed of the take-off, had expected the C-47 to run the length of the field.

Captain Last's choice had been a wise one.

—Kenneth M. Baker

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FLAT SPINS

AIRLIFT PILOT WANTS TO SEE BERLIN

•

COZY COTTAGE IN A C-47

•

COAST-TO-COAST FLIGHT TOOK 49 DAYS

• AN AGE-OLD QUESTION
Airline pilots can hold their jobs efficiently to the age of 55. That's the opinion of Dr. Ross A. MacFarland, of the Harvard School of Public Health. Dr. MacFarland also said that aircraft piloted by men over 40 are involved in fewer accidents. The reflexes of older pilots may be slightly slower, he added, but this is compensated by greater knowledge, experience and calmness.

• TOUCH AND GO
In 1911 Calbraith P. Rodgers was the first aviator to fly across the U. S. His actual flying time from New York to Los Angeles was 3 days, 10 hr., 14 min. but it took him 49 days to make the coast-to-coast trip. Reason: 68 stops for gas and repairs.

About half of the 5,000 persons building a large airport in Berlin are women.

• NON-AVIATION REVENUE
Milton Reynolds, Chicago fountain pen tycoon and aviation booster, is a man of ingenuity. When he landed at Shannon Airport in Eire without a cent in his pocket, he promptly raised cash for cable fees by selling cigarette lighters and fountain pens to nearby waiters and porters.

• CLEVER, THESE JAPS
Canary cages flown from Japan to the U. S. are equipped with dry cells and lights to provide illumination in the dark cargo hatches for the birds to eat and drink.

• COZY C-47
A surplus C-47 has been made into a comfortable home, complete with red and white awnings, by Dr. H. H. Lancaster of New Holland, Ga. The detached wings are being made into an outdoor table and sun deck.

In one year ground damage to aircraft by ramp employees cost a major airline over $500,000.

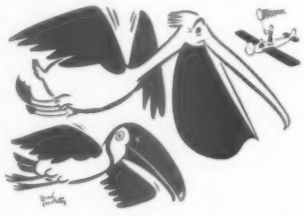
• ONE-MAN AIRLINE
Tom French, an Australian war pilot, is making a one-man, one-passenger airline pay. Flying out of Suva, in the Fiji Islands, his 91-mile flight across the island takes 70 minutes instead of five hours by road. Customers queue for the plane.

Washington, D. C., flight instructors tell their students: "There's only one thing you have to worry about in aviation these days. Make sure you get to and from the airport safely in your automobiles."

• UNFORESEEN DELAY
Ex-paratrooper Clifton Cheshire of Houston, Tex., made a delayed parachute jump that was really delayed. Cheshire blacked out after he jumped at 22,000 feet. He had planned to open his chute at 800 feet but didn't regain consciousness until he was 200 feet from the ground.

• JUST ONE PEEK
After more than 135 trips to the Berlin airport, Lieut. Nathan L. Giles, airlift pilot, has only one gripe. "I'd like to have just one peek at Berlin," he said. "But, so far, I've been too busy."

• NET GAIN
While flying a Curtiss pusher-seaplane in 1912, Augustus Post found himself in tight formation with a large number of pelicans, seagulls and ducks. It occurred to him that by attaching a strong net between the wings it might be possible to bag a bird while in flight. Post's novel idea failed to impress his fellow pilots, but



it did appeal to Mrs. L. J. Atwater, one of the students at the Curtiss School in San Diego. She persuaded her instructor to take her up for a sky hunt. After an hour of fruitless efforts and a near collision with a pelican, they called it a day. Mrs. Atwater was persistent, however, and later actually succeeded in "netting" a seagull while flying with her husband. Despite her success, there is no further record of this more than slightly dangerous sport.

—Harold Helfer

Baby Your Engine

(*Continued from page 37*)

are good to their engines in regard to service are also good to their pocketbooks in dollars saved in time between major overhaul.

It is difficult to present actual figures for the variation in the number of hours of operation between overhaul, based on the use of the engine at different throttle positions. Such data is not exactly the same for all engine types and all engine models. However, a study of service records over a long period indicates an interesting pattern.

This is shown in Figure 2 and should be studied carefully by all operators. This curve represents the case of the engine only, without reference to the airplane. The effect of the installation of the engine in an airplane is discussed later and it will be seen that it is not always possible to obtain the very high periods between overhaul because of the limitations of the particular airplane's performance characteristics.

Engine Life and Airplane Speed

The difference in time before major overhaul for a given airplane operated at different speeds also follows an interesting pattern and in many respects is comparable with the effect of the throttle position.

Figure 3 is a representative chart of this condition. It will be seen that the shape of this curve is different from the one presented for the effect of throttle position on engine life. This change is due to the variation in the power required for level flight as the airplane speed is decreased. From approximately maximum speed to 90 per cent of maximum, the airplane speed is almost a direct function of the engine r.p.m. and the power required decreases as the cube of the speed.

If, in this range, the engine speed is decreased from full throttle to 90 per cent, the airplane speed in level flight will also be decreased to approximately 90 per cent of the maximum airplane speed. For example, for a fixed pitch propeller if the maximum airplane speed at a given altitude is 150 m.p.h. at 2,500 r.p.m. and the throttle is partially closed to obtain 2,250 r.p.m. for cruising or 90 per cent, then the airplane speed will be very close to 90 per cent of 150 m.p.h., or 135 m.p.h. The power available varies as the cube of the engine speed. Consequently, if 180 h.p. was required for 150 m.p.h., only 73 per cent or 131.5 h.p. will be required at 135 m.p.h. This rapid reduction in power required has an important effect on engine life.

For speeds below 90 per cent of the maximum, the change in the airplane drag co-efficient begins to show its effect and the power required for level flight decreases at a lower rate until a minimum value is reached somewhere between 50 and 60 per cent of the maximum. Below this value the power required begins to increase and in low powered airplanes at or near the stall

PLANE FAX

THRIFT TIPS

How to reduce flying expenses

A page of service tips for private flyers and fixed-base operators

SAVE FUEL

Use Improved Chevron Aviation Gasoline (80/87)

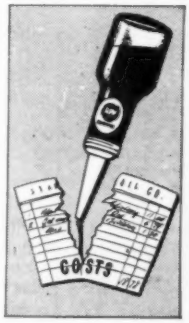
You'll enjoy fuel economy and maximum power with Chevron Aviation Gasoline (80/87)—that brand new fuel with the controlled take-off anti-knock rating. This fuel virtually eliminates the possibilities of take-off detonation . . . means even combustion without waste . . . smoother, quieter, safer take-offs than you've ever known . . . less wear on vital engine parts. And at no extra cost.

Extra savings go to pilots of larger aircraft whose engines once required 91/98 fuel. Improved Chevron Aviation Gasoline (80/87) already has been approved by Pratt & Whitney Aircraft for use in their Wasp Jr. engines. Now you can cut expenses two ways—lower fuel costs and lower maintenance costs. That's because of knock-free operation and reduced lead content which insures freer, cleaner operation.

"We take better care of your plane"

Cut overhaul costs and engine wear—use "RPM"

Many flyers double the time between overhauls and cut down expensive repair bills by using RPM Aviation Oil. They've found that ordinary oils run away from hot upper cylinder walls, and let pistons grind and scrape. But "RPM" is specially compounded to cling to hot spots most oils leave bare, keeping a protective oil coating over all engine parts.



CHEVRON AVIATION GASOLINE

RPM AVIATION OIL

Standard Oil Company of California

could easily equal or exceed the power available from the engine. The decrease in propeller efficiency adds to this effect and the combination produces the flattening of the curve in Figure 3 followed by a decrease in time between overhaul as the airplane speed is further decreased.

The airplane and engine manufacturer give these factors careful consideration as part of their test programs, and base their recommended operating conditions on these and other considerations as outlined.

Detonation in Aircraft Engines

To insure safe engine conditions, operating factors resulting in detonation must be avoided at all costs. This is easily accomplished over the full range of engine power if proper precautions are taken. Service records indicate many cases of detonation which have led to serious engine damage. Many times this has been wrongfully blamed on the engine or airplane manufacturer.

Detonation shows up as a rapid and violent explosion in the cylinder which results in extremely rapid and abrupt changes in pressure somewhat equivalent to a hammer blow. These high pressures are transferred to the piston, cylinder, bearings, connecting rod, cylinder head, hold-down bolts and crankcase. Fatigue stresses result which are of sufficient magnitude to cause a failure.

The phenomena of detonation is not too well understood because of the rapidity with which the pressure wave takes place. However, for the operator, what is more important is to know how to avoid it. The following factors are usually responsible for detonating conditions.

1. Improper grade of fuel. The manufacturer's recommendation should be followed closely and care exercised to obtain fuel of the correct octane rating, especially in the upper power rating.

2. Cylinder head temperatures above approved limits. As part of the testing program required for the approved type certificate, both the airplane and engine manufacturer conduct extensive tests to develop a design which will hold the engine temperatures within limits to produce good engine life.

The airplane manufacturer provides a system of baffles and cowling to make the best use of the cooling air and hold the temperature within the engine manufacturer's recommendations.

It is highly important that the operator should not modify any part of this system and should take extra precautions to determine that all baffles are in their proper place and in good condition.

In slow speed airplanes, particularly in the climbing attitude, the quantity of air available for cooling is limited and yet this occurs during the period when the engine is developing maximum power. Therefore, the air which is available must be used to the best advantage. To do this the airplane manufacturer introduces a system of cowling and baffles which will cause virtually all of the air to flow thru the engine fins and over the accessories. Any holes or gaps which will allow air to flow out of the cowling without first passing over the engine is obviously wasted and this results in a reduction of the quantity available for actual cooling. The result may easily produce high cylinder head and barrel temperatures as well as high oil temperatures.

Consequently, it is good practice at the top overhaul period of the engine to check the location of baffles and other parts of the cooling system. The importance of this item is well illustrated if it is considered that in a conventional four-cylinder engine there is only about 28 sq. in. of open passage for the air through the fins. A gap of ¼ inch between the vertical baffle and the cowling would produce an opening of about seven sq. in. This is 25 per cent of the available space and since the air will flow through the path of least resistance a great quantity of air will be wasted and overheating will occur.

3. Lean mixtures. Operating at lean mixtures at or near the best power output of the engine can produce detonating conditions. This can easily be avoided by enriching the mixture slightly beyond the best power condition.

4. Improper adjustment of ignition system. This is not a common occurrence but it is known that detonating conditions can be produced if the timing of the spark is too far advanced, particularly at the upper power range of the engine. Detonation may also be produced sometimes when only one spark plug is functioning in one or more cylinders.

5. High carburetor intake air temperatures. Excessive carburetor air temperature through the use of too much preheating of the air has also been known to cause detonation. This is particularly true in supercharged engines where additional heating of the air takes place as it passes through the supercharger and other parts of the induction system.

6. High Manifold Pressure. This applies primarily to supercharged engines and it is known that excessive manifold pressures may cause detonation. This usually occurs where throttle stops are used and the throttle is opened too wide under conditions not recommended by the manufacturer. END

COMPASS COMPENSATOR

A NEW METHOD of "swinging" aircraft compasses has been developed by the Wakefield Engineering Company of Coeur d'Alene, Ida.

The Wakefield Compensator consists of a bowl-shaped turntable which turns on a base plate containing a 360° compass rose dial. An adjustable pointer makes it possible to read the plane headings in degrees. The entire mechanism is permanently mounted in a slab of concrete on the airport.

When an aircraft compass needs adjusting, the plane is headed approximately north and one wheel rolled into the bowl of the turntable. The plane is then rotated until its heading is exactly magnetic north (this is accomplished by aligning the other wheel with a reference line). The compass points are then

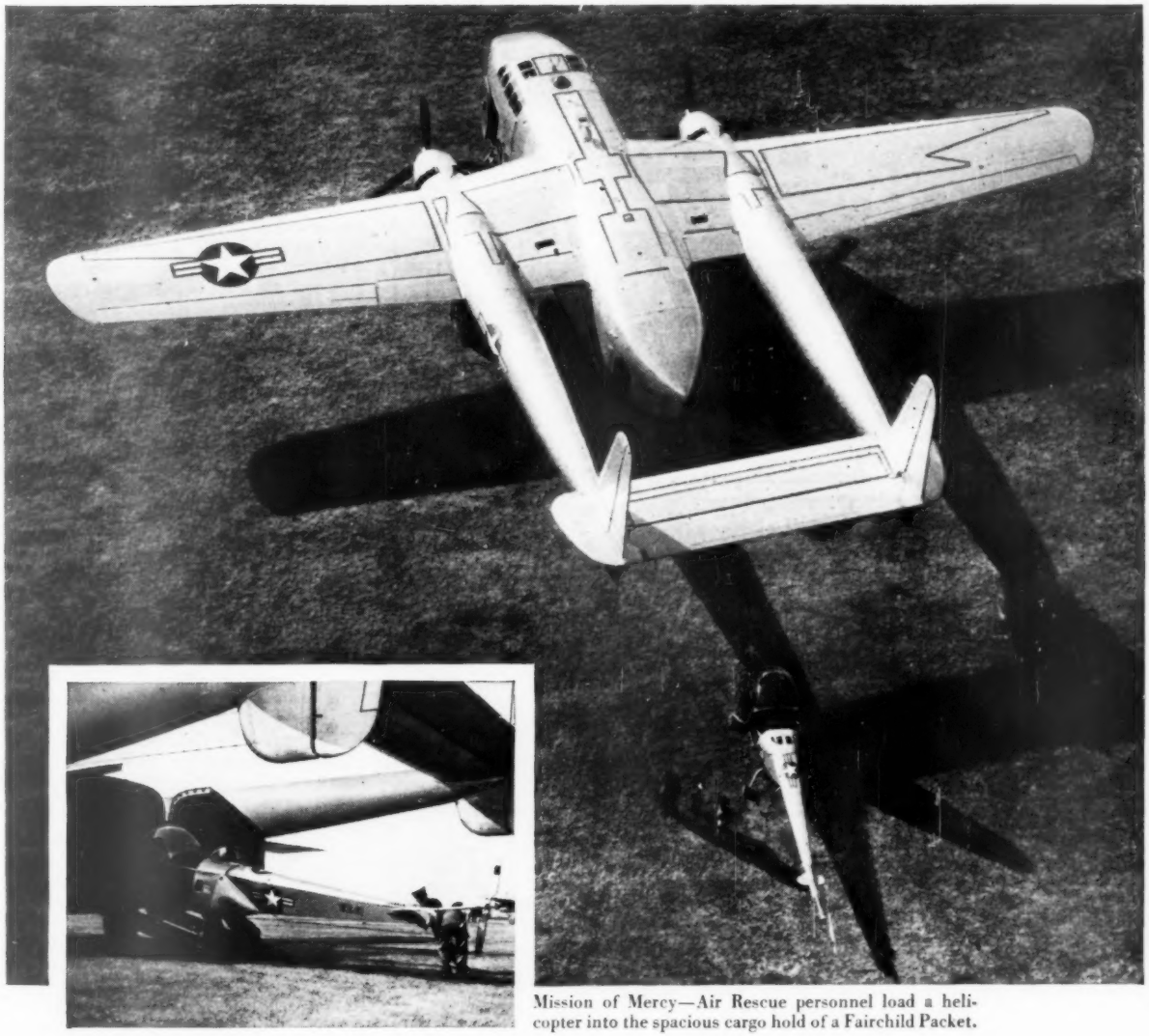
determined by simply swinging the plane around until the pointer indicates the desired headings on the dial. The compass is compensated accordingly—the entire operation for a lightplane taking only six to seven minutes.

Available in three sizes, the Compensator can take care of everything from *Cubs* to dual-wheel airliners.

—KYLE M. WALKER

AIR RESCUE

Over faraway jungles, deserts and mountains, helicopters of the USAF Air Rescue Service have flown in search of stranded airmen and passengers. The helicopters got there because they have been given a "mother" ship—the Fairchild Packet—that transports them over distances far beyond their range. Thus, our Air Force has added a new ability to the versatile Fairchild Packet—increasing the importance of its part in the development of modern airborne military tactics.



Mission of Mercy—Air Rescue personnel load a helicopter into the spacious cargo hold of a Fairchild Packet.

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The Atom

(*Continued from page* 33)

lasted, like Hollywood marriage, but thinking it over the next day I suddenly began to be aware that he had disclosed what must be the reason why Russia has shown no fear at all of our atomic bomb, an uncooperative attitude which has annoyed our statesmen no end because statesmen all over the world get quite huffy if they are not taken seriously when they are scaring somebody.

My Russian friend had a pronounced accent—I never heard of an unpronounced accent—and with it he told a story that will shake our atom chefs right down to their Phi Beta Kappa keys. When you read the story you will understand why I am making friends with some local gophers who have a hole. Don't take it too lightly. There is many a jest that turns out to be true, as our parents found out. Here is his story without the accent or the spray.

* * *

Do you know why, he began, the American atom bombs had only one atom out of 1,000 go into fission? Well, my friend, it was because of heat. Heat expands, no? Yes. You need a dense neutron fog for fission, and when fission started, the plutonium mass began to expand and soon the fog was not dense enough; the k factor was below 1. We Russians let the Americans spend their own money on the first tests and get into a rut. Not us.

We decided to control the expansion. The way we do that is to have on the outside of the mass, which is in the shape of a ball, a layer of beryllium (I think he said), and when we explode the bomb we make radium (I think it was) to cause the beryllium to give out a dense cloud of neutrons all over the surface of the fission mass which is shaped like a ball. The explosion starts all over the surface so the pressure tends to work against the expansion.

No, no, my friend, that is nothing. That gives us a bomb that is a few hundred times as powerful as the capitalist bomb, but while the Americans argued we went on in our quiet way. We made a discovery that will shake the world; shake the world good, no? Yes.

You split a heavy atom like uranium and you get some power. But if you can combine two light atoms like hydrogen you get much more power, immensely more. To do this takes very much heat and very much pressure. Such is going on in the sun; hydrogen atoms combine to form helium. Could the Soviets do this? We could.

The way our uranium ball is set off, the heat and pressure lines converge inward so that in the middle it is very hot and very—ah—tight, no? Yes. So the inside of the mass is filled with hydrogen.

But what should we use as hydrogen? Not hydrogen, no. Water. Although I dislike it, that is true. Water. But wait. To get hydrogen atoms to combine we need a catalyst, just as on the sun, and that is carbon. How to get carbon atoms evenly distributed among the atoms of the water? Carbon dioxide in solution? That is soda water, is it not so? And also, what else? Sugar? Sugar is a carbohydrate, carbon and hydrogen. Very well, what do you have? Soda pop. With soda pop we will conquer the world!

My Russian friend was getting in bad shape. I noticed that his outlines became quite fuzzy at times, and his form had a strange tendency to double. I put it down to his having had too much to drink. "Look here, Ivan," I asked, "don't your atom people have arguments like the American ones do?"

"Oh, sure," he replied. "Bolotovski is all for strawberry flavor, but I'm a lemon man myself."

It seemed about time for me to go home and collect my thoughts which were somewhat overdue, so I rose. "Toodle-oo," I said.

"Pop, pop," he replied.

* * *

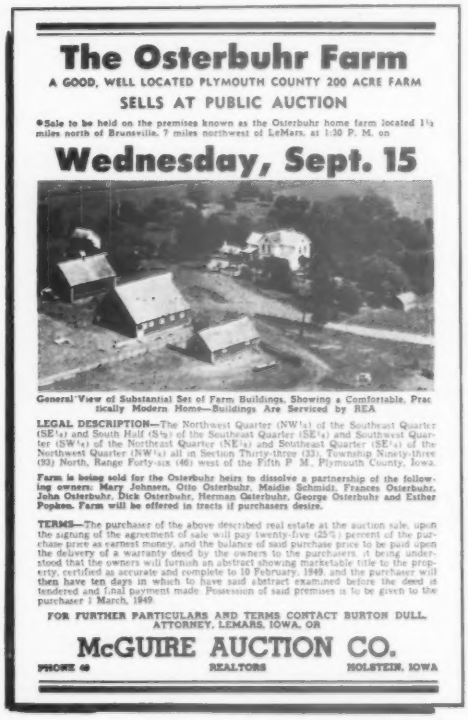
Well, there it is. It seems kind of silly to have two nations building soda pop factories like mad. But there was something convincing about his story, perhaps its very implausibility. Nothing could be more implausible than bent space and energy jellied into matter, which are true. Maybe I shouldn't have said anything about it, popped off, as it were.

At any rate I hope that this time when the FBI men call upon me they will bring their own truth serum. I don't mind furnishing the corkscrew. END

FLYING CAMERAMAN

KEN DuVON'S aerial photo business got started by accident when, several years ago, a farmer asked him to photograph his 160-acre farm.

Using a Kodak "35," DuVon (who operates Westmar College Airport at Le Mars, Iowa) made several kodachrome shots, among them the above photograph. When the farmer saw the finished pictures, he was astonished. "They tell me as much about soil conditions as I could learn from a lot of soil tests," he said. (The snake-like mark in the photo above, for instance, shows the path of a manure spreader.)



The Osterbuhr Farm

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•Sale to be held on the premises known as the Osterbuhr home farm located 1½ miles north of Brunsville, 7 miles northwest of LeMars, at 1:30 P. M. on

Wednesday, Sept. 15

General View of Substantial Set of Farm Buildings, Showing a Comfortable, Practically Modern Home—Buildings Are Serviced by REA

LEGAL DESCRIPTION—The Northwest Quarter (NW¼) of the Southeast Quarter (SE¼) and South Half (S½) of the Southeast Quarter (SE¼) and Southwest Quarter (SW¼) of the Northeast Quarter (NE¼) and Southeast Quarter (SE¼) of the Northwest Quarter (NW¼) all in Section Thirty-three (33), Township Ninety-three (93) North, Range Forty-six (46) west of the Fifth P. M., Plymouth County, Iowa.

Farm is being sold for the Osterbuhr heirs to dissolve a partnership of the following owners: Mary Johnsen, Otto Osterbuhr, Maidie Schmidt, Frances Osterbuhr, John Osterbuhr, Dick Osterbuhr, Herman Osterbuhr, George Osterbuhr and Esther Popken. Farm will be offered in tracts if purchasers desire.

TERMS—The purchaser of the above described real estate at the auction sale, upon the signing of the agreement of sale will pay twenty-five (25%) percent of the purchase price as earnest money, and the balance of said purchase price to be paid upon the delivery of a warranty deed by the owners to the purchasers, it being understood that the owners will furnish an abstract showing marketable title to the property, certified as accurate and complete to 10 February, 1949, and the purchaser will then have ten days in which to have said abstract examined before the deed is tendered and final payment made. Possession of said premises is to be given to the purchaser 1 March, 1949.

FOR FURTHER PARTICULARS AND TERMS CONTACT BURTON DULL, ATTORNEY, LEMARS, IOWA, OR

McGUIRE AUCTION CO.

PHONE 40 REALTORS HOLSTEIN, IOWA

That gave DuVon an idea. He began taking photos of farms in the rich Iowa agricultural area. Auctioneers used his services (see photo, left), as did a leading bank—which ordered annual photos of all its farm property.

Today, DuVon's business is thriving. He still uses a 35 mm. camera for most assignments.

To ready his Cessna 140 for aerial photography, he takes out the screw which holds the side window arm to the lower edge of the frame. In the air, the window is held open horizontally by air pressure.

His method is simple: He trims the plane, sticks the Kodak out, and "shoots."

—CHARLES T. PEARSON

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Thunderstorms

(Continued from page 23)

3. *Don't fly through the middle of a thunderstorm.* The updrafts and associated turbulence in a thunderstorm cell probably increase with height up to a level of about 10,000 feet below the maximum height of the particular cell. The pilot cannot, of course, know how high the cell is in which he is flying.

In an average thunderstorm, the greatest turbulence is around 15,000-16,000 feet. The maximum updraft and downdraft averages are at 26,000 feet. In general, updrafts are greater than downdrafts at all altitudes except the 6,000-foot level. For this reason, the average passage through a thunderstorm will find the plane at a higher altitude when it is through than when it entered the storm.

4. *Do fly through the lower portion of the thunderstorm.* In both Florida and Ohio, fewer large velocity gusts per mile were found at the 5,000 and 6,000 foot levels above the terrain than at other levels. The maximum gust measured at the 5,000 and 6,000 foot levels had a lower speed than the maximum gust at any other level. Pilot reports of turbulence encountered in flying through thunderstorms also showed a minimum of moderate and heavy turbulence at 5,000-6,000 feet. No data were taken a lower levels. At 5,000-6,000 feet, no gust was encountered that had a velocity over 24-28 feet per second and only a minimum of gusts were more than 12-16 feet per second.

Drafts, as distinguished from gusts which are short term upward or downward movements of the air, cause systematic altitude changes even though the air speed remains fairly constant. The strongest updrafts and downdrafts are, like the gusts, found in the middle and upper levels of the storm. At 5,000-6,000 feet, for instance, the maximum updrafts encountered in any storms were 30 to 39.9 feet per second and there were only two of these. At 15,000-16,000 feet, however, 60 updrafts of that speed or higher were encountered. The same tendency is apparent with downdrafts.

All evidence indicates that instrument pilots should take their clearances for low levels. In the eastern part of the United States they should stay down as low as they can get clearance when they are flying in thunderstorm areas. If they can't get 3,000-4,000 feet, they should try to get 5,000 or 6,000. In the western part of the country this rule obviously must be interpreted with mountains in mind.

5. *Don't try to hold altitude.* Let the gusts or drafts carry you up or down as the case may be. Be prepared to increase your power if loss of altitude continues, but avoid it if possible. More power will give more speed and turbulence will increase the stresses upon the airplane. In a downdraft the pilot may have to go into a slightly nose-high attitude for a partial climb, but thunderstorms are traversed in a few minutes. Downdrafts are unlikely to carry pilots into the ground, though there is always the danger, depending on terrain, that they will carry the pilot low enough to fly into an obstacle. *Perhaps half the time, an updraft or downdraft will displace the aircraft more than 500 feet.*

6. *Never turn around and go back once inside the storm.* Most thunderstorms are small enough so that once you're inside it doesn't pay. Most are only about 10 miles across and many are less. An exception to this is a squall line which a pilot might hit lengthwise—it might be several hundred miles long.

Turning around has other disadvantages. It is a control maneuver which adds its own load to the gust load and increases stress on the wings. Changing headings in a storm may get you navigationally lost. By the time you make up your mind to turn around, the chances are that you're through the worst of the storm and it's shorter to go on through.

7. *Fly around rain areas.* If you can see the rain at low altitudes when you are flying underneath, fly around it (within the cloud pilots can't see rain areas ahead, and in addition it is hard to tell whether the water droplets they are flying through are actually falling rain or drops in suspension in an updraft).

Many older manuals of instruction indicated that areas of least turbulence should correspond with areas of heavy rain because of the "stabilizing effect" of the rain. Precisely the opposite is usually true. Rain areas not only indicate downdrafts but are also the areas of heaviest turbulence. Pilots avoiding them also gain the priceless advantage of visual contact.

8. *General technique.* The Thunderstorm Project recommends the following procedures in flying thunderstorms: Trim up plane for straight and level flight at reduced airspeed. Use pitot heat, carburetor heat, cockpit lights at night. If you have a VHF radio, keep the headphones on because you might get some useful information. If you have the old long-wave type of set you might as well turn your radio off and hang up your earphones.

Fasten your seat belt securely. Prepare yourself mentally for a rough ride. From there on, let the plane ride out the turbulence with a minimum of control, easing it over the rough spots. When a wing kicks up, don't roll an aileron, or at least be very cautious about it. Leave it up; it'll roll back. Be cautious about all plane controls. A nose-up attitude and slow speed might mean an inadvertent stall because of turbulence. Nose-down means increasing airspeed which increases the stresses of the turbulence.

The rules outlined above contradict many of the requirements of airways clearances, holding procedures, and of air traffic control generally. Frequently ATC, not knowing where thunderstorms may be, assigns pilots to hold in them. Or ATC assigns pilots a flight level through thunderstorm territory at the most turbulent levels. If the pilot goes up or down he risks collisions with planes assigned at those levels. Furthermore, it is not only virtually impossible to hold a level, but cautious flying procedure, as explained, advises against it. One updraft measured by the Project carried an P-61C up 6,000 feet. This is a problem that has to be licked by other than the arbitrary ATC procedures used at present.

ICE. In two seasons of flying *Black Widows* through thunderstorms, there was no occasion in which ice accumulated enough to make safe flight impossible. Ice was encountered on more than half of all traverses at the 20,000-foot level but in most cases the aircrews classified it as rime. The reason for the lack of icing trouble seems due to the comparatively short time airplanes flying in thunderstorms are subject to icing conditions. In almost every instance the ice evaporated between traverses while the planes flew in the clear air.

HAIL. Few instances of hail were noted either in Florida or Ohio. Where hail was noted, it tended to be in the middle levels of the storms, and the Project concludes that the region of hail and the duration of hail in that region are relatively small. When hail was present, it was found on 25 per cent or less of the traverses through the storm even on the level of its occurrence. In these regions, therefore, it is likely that a plane will not encounter hail even if it should be in the storm. Storms farther west, particularly in the Great Plains areas, have considerably more hail than those studied by the Project.

LIGHTNING. During two years of operations, Project planes were struck by lightning 21 times. Damage was almost always limited to a group of small holes in the airplane skin. On one occasion, however, lightning struck the pitot tube and the pilot reported a momentary airspeed indication of 600 m.p.h. The pitot tube was bent a few degrees from normal. No complete radio failure could be attributed to the effect of lightning.

TORNADOES. The storms flown through

"And There I Was . . ."

FLAT-HATTING BICYCLE

While flying a low-level cross country over the Midlands in England, we reduced our 200-ft. minimum "a bit" (about 194 feet to be exact). Our *Mosquito* was doing about 320 m.p.h. when I spotted a cyclist riding on top of a dike about two miles ahead. Turning gently

so as to cross his path at right angles, we passed about fifty feet in front of him.

My navigator, Ted, caught a glimpse of the flabbergasted cyclist, then turned to me and said: "Boy this is a bit too dangerous for me. One of these days we'll be getting run over by a fool bicycle!"

JAMES F. DYER

by the Project planes were rated by the pilots as "light to very severe." No data was obtained on hidden tornadoes which some persons believe may account for some of the destruction wrought on airplanes in thunderstorms. No tornado funnels were observed during the flights, although in one instance a funnel was observed shortly after a mission

PRESSURE CHANGES. One peculiarity of thunderstorms appears to be the rapid surface pressure variations which can occur. Pressure may rise, stay high for several minutes, then return to its previous value. Occasionally it falls and then rises. A special study was made to determine whether these pressure changes affected altimeters enough to be hazardous.

In 22 per cent of the cases, if a pilot had landed during the maximum pressure with an altimeter setting given him 10 to 15 minutes earlier his altimeter would have indicated that he was 60 feet or more below the true altitude. If a pilot used an altimeter setting given him during the maximum pressure and landed after the pressure had fallen, in 26 per cent of the instances he would have found that his altimeter still read 60 feet or more above the true altitude after he was on the ground. On two occasions the altimeter would have read over 140 feet above the true altitude when he landed.

The final reports of the Thunderstorm Project have not contradicted the main conclusions of the preliminary findings after the Florida study, reported in FLYING two years ago. The Project believes that some of the horrendous tales of thunderstorm fury which have been reported by pilots caught in them tend to be exaggerated. A thunderstorm in itself is a violent act of nature, but two years of research failed to indicate that any thunderstorm cannot be traversed safely by a properly flown and properly instrumented airplane. Thunderstorms are unpleasant and dangerous, but trained instrument pilots in adequately instrumented airplanes can fly them safely.

The Project believes that many of the cases which have been reported of planes disintegrating in storms have resulted only because they were inadequately designed, flown or instrumented. The pilot, flying blind, lost all orientation, got on a dive or on his back, and in attempting to right the airplane pulled too many G's and knocked the wings off or otherwise caused a structural failure.

In the future, the Project believes that devices will be developed which will enable instrument pilots to fly thunderstorms with a minimum of difficulty and without even encountering much turbulence. The existence of the gust-free pathways between the thunderstorm cells offers this hope. Radar can pick out these pathways and flight tests of cockpit radar in weather indicate high praise for radar in detecting thunderstorm cells and in pointing out the quiet airways between them.

This is the first of two articles on the research findings of the Thunderstorm Project. The second article, to be published next month, is devoted to lightplane flying around thunderstorms.

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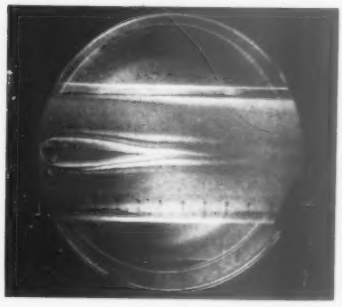
WET WIND TUNNEL

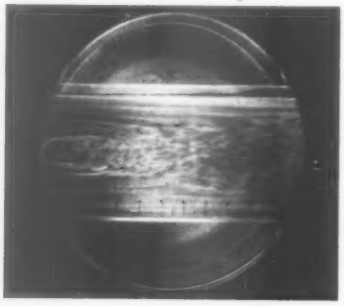
ENGINEERS at Boeing's Seattle plant are learning new secrets about turbulent air by watching the flow pattern of "muddy" water. The flow is controlled through a miniature tunnel in which opaque water (created by suspending Bentonite clay in it) flows through a channel and around a tiny streamlined object.

While operating much like a conventional wind tunnel, the wet tunnel is slow-motion by comparison. Water flows at a rate under 10 feet per second, but the slow velocity produces flow patterns similar to air moving at high speeds.

The test tunnel accommodates small Plexiglas models of two-dimensional objects. A high-speed camera, shooting 3,000 frames per second, catches each flow-pattern as it forms, grows and breaks. Engineers study the film minutely and from the photographs are able to determine what will happen to air flowing around a ram-jet section or other component of the same cross-sectional shape.

Photos show flow around a two dimensional cylinder as the streamline starts to break. With increased speed, the streamline eddies and loses its form.





Report from Washington

(*Continued from page 40*)

spare parts to keep the planes flying? Defense officials admit this is a pertinent question. They reply that only the more recent types will be pulled out of reserve and that there are adequate stocks of parts for these planes. Some of the models are still in production. But in non-governmental aviation circles there is less optimism concerning the parts problem. Some think it will be a headache.

Ultimately, the domestic aircraft industry should receive orders for new planes to put western Europe's defenses in proper shape. It is a good bet that the arms aid business will last more than a year. When pressed on this point during his appearance before Congress, Defense Secretary Johnson did not pull punches. He said that while he does not know what further aid might be required, "we are in for a program that will last four or five years."

If it lasts beyond a year, U. S. reserve stocks will not be sufficient to meet the continuing need. Congress has stipulated, anyway, that the barrel shall not be scraped to the point that U. S. security will be imperiled.

New Appointments

The President's signature on the new measure tightening up the unification act was scarcely dry before Defense Secretary Johnson started making things hum. He named Gen. Joseph T. McNarney, veteran airman, as head of a new high level board to make the unification act work. This board has been called an "action group." Its job is to speed up consolidation. It will try to eliminate duplicating functions, will also go into the ticklish question of closing Army posts, Navy Yards and Air Force bases.

While Secretary Johnson now has stepped-up authority as head of the Defense Establishment, Congress made a point of writing in a few reservations. One of them prevents Naval and Marine aviation from being shifted into any other department. Another permits the civilian and military chiefs of the Army, Navy and Air Force to go over Johnson's head to Congress at any time. It was decided that this safeguard was advisable after there were complaints that high officials were muzzled under Johnson's hard-boiled administrative policies. Congress gets its dander up when it suspects restrictions are being placed on its powers to scrutinize the operation of any Government department.

The new act creates a Department of Defense composed of the Army, Navy, Air Force and several boards and agencies. The Departments of Army, Navy and Air Force are reduced a few notches in rank. They become "military" instead of "executive" departments. The Defense Secretary gains sole responsibility for the "direction, authority and control" of the military forces. Previously he had only general control.

Congress also created the new post of Chairman of the Joint Chiefs of Staff. This will make it easier to obtain prompt decisions on a high military policy level. Gen. Omar N. Bradley, Army Chief of Staff, was selected for the new job.

A new office of civilian "business manager" or comptroller is established. Its task is to bring about sweeping budgetary and fiscal reforms. (Secretary Johnson has expressed the belief that $1,000,000,000 can be trimmed from the military budgets by instituting better business methods and by eliminating duplication. In fact, the prospect of accomplishing a substantial saving helped persuade Congress to pass the new measure.)

Needed for Economy

Even though many of the men on Capitol Hill did not particularly relish the idea of giving the Secretary of Defense additional powers, most of them realized that such a move is essential if the merger is to result in any real economy. The money saved in defense appropriations is expected to offset the cost of the military pay-raise bill which followed in the wake of the unification act.

Whether appreciable savings will be realized is a question that in the end will depend on Congress. Despite the glib talk about doing away with overlapping, the truth is that Congress itself has always blocked the elimination of military establishments that have fulfilled their usefulness. No matter how much they may extol the virtues of economy, individual members will fight to the last ditch to keep a navy yard or other big base in their district or state from being closed. As a result it has been next to impossible to get rid of obsolete facilities. END

Rent or Buy?

(*Continued from page* 32)

man has found that he can fly his route faster and cheaper than he can drive it. He saves time and hotel and meal bills. It was only smart for him to buy a plane rather than continue to rent one.

Most airport operators charge about $8 an hour for solo time. Many of the smaller fields again offer the pre-war $6 an hour solo rate. Glancing back at our chart, it will be seen that $6.85 is the hourly cost to a lightplane owner who flies 200 hours per year.

Many airport operators will offer a lower rental rate if a block of time is bought in advance. When I was engaged in commercial airport operation, a $1 hourly discount was offered for 10 hours flying time paid in advance. It can be seen from these figures, therefore, that unless you plan to fly more than 200 hours per year you can rent for approximately the same $6.85 per hour that it costs the lightplane owner to fly his own plane—but you lose the convenience of ownership.

Analyzing operating costs on a four-place plane like the *Navion* or *Bonanza* in the $9,000 price class will show similar results. Gasoline consumption is figured at 11 gallons per hour. Oil changes are at 20 hours (eight quarts) plus five quarts added between changes. Maintenance includes 100 hour checks, top and major engine overhauls.

The insurance figure is based on all risk coverage, 10 per cent deductible. This costs about $909 yearly for $9,000. Passenger liability (three seats) costs about $63. And $5,000/$10,000 liability and property damage costs about $31 more. This totals just over $1,000 yearly, or approximately $5 per hour. The pilot and first 10 per cent aircraft damage are not insured without extra premiums.

The $3.60 hourly depreciation rate is based on 12½ year plane life and 200 hour yearly use (plane cost $9,000). Hangar rent $1.50 per hour is figured on 200 hour utility and a $30 monthly rental.

These figures add up to a $15.65 hourly cost to the $9,000 plane owner who flies only 200 hours per year. Most airport operators charge between $17 and $20 rental per hour for planes in the *Navion* and *Bonanza* class. However, a figure close to $15.65 per hour would probably be acceptable to most commercial operators if blocks of time (10 hours or more) were bought and paid for in advance.

Naturally, there are other factors (besides financial) pro and con which should influence the private pilot's decision on whether to rent or to buy a plane. How much cross country flying will your local airport operator allow? Does he charge for lay-over time at other airports? Do you mind waiting in line, on Sundays, for the chance to fly? These are only a few of the obvious objections to renting a plane. You can surely think of several others.

Unless a private owner is himself mechanically inclined, a commercial operator has access to better all around aircraft maintenance. Because an airport oper-

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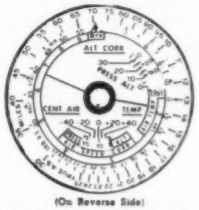

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ator flies each plane many hours per year and is entitled to dealer's discounts when purchasing new aircraft his hourly costs are lower than those of most private flyers. Some pilots find that dual instruction is easier to obtain when flying a rented plane. Many operators are too busy with their own planes to give dual instruction in privately-owned ships. Private owners who experience this difficulty can often obtain the services of licensed instructors other than airport operators. In the Atlantic City area, I know of at least five capable flight instructors who work at non-flying jobs and like to keep up their ratings by teaching week-ends and evenings.

One other factor to be considered is interest on investment. If you buy a plane for $2,500 or $9,000, you must consider a 3 per cent interest loss on your investment. This would be paid if you put the money in bonds, or a savings and loan association, for example. This adds slightly to the hourly cost.

No chart or set of figures will meet the approval of every pilot. Some will be convinced that the figures are too high and some will feel they are too low.

There are, of course, the possibilities for club or partner ownership of private planes. Naturally, any joint ownership of private planes will cut down expense to each individual partner. The purchase of a used plane instead of a new one, will cut the hourly cost of depreciation and insurance considerably.

It's up to the owner whether his plane is to be just an expensive toy or a useful economical vehicle. If he uses it enough, he will find it provides the cheapest form of transportation possible. END

Instructor Flies Blind

(*Continued from page* 31)

all, the instructor must demonstrate the landing maneuver by actually making a faultless one himself. From the rear seat, this is! But before he can even attempt the landing he must ask his begoggled student to put down 20° of flaps.

Unfortunately, the SNJ is not a push button airplane, and by the judicious backward and forward movement of the flap handle the student lowers the flaps to within a plus or minus 10° of the desired 20°.

Of course the instructor has no way of knowing just how much flap is down. He could ask the student over the interphone but this would be an admission of ignorance and a direct insult to the student's mechanical aptitude in pushing and pulling levers. So not knowing whether he has full flaps, no flaps, or half flap the instructor struggles toward the intended landing.

It isn't much of a struggle as long as the plane is in a turn. He can see ahead just a little bit. But when he straightens out, the effect is like somebody suddenly clamping a potato sack over his head. The instructor can see straight up if he is interested in cloud formations. He can stick his head out and look straight down at the pine trees. But no matter what he does, he can see very little straight ahead. By looking ahead he can see the drab green overturn structure and the eager head and shoulders of his student. He can even tell whether the plane captain wiped down the canopy and wings.

He can see many interesting things but he can't see the runway up ahead or his landing spot. The solution seems obvious but it doesn't work. Stick your head out the side, you say? No! If you look out the left side, the left wing goes down; look out the right side and the right wing goes down. Land with a wing down and the taxpayers get the bill March 15!

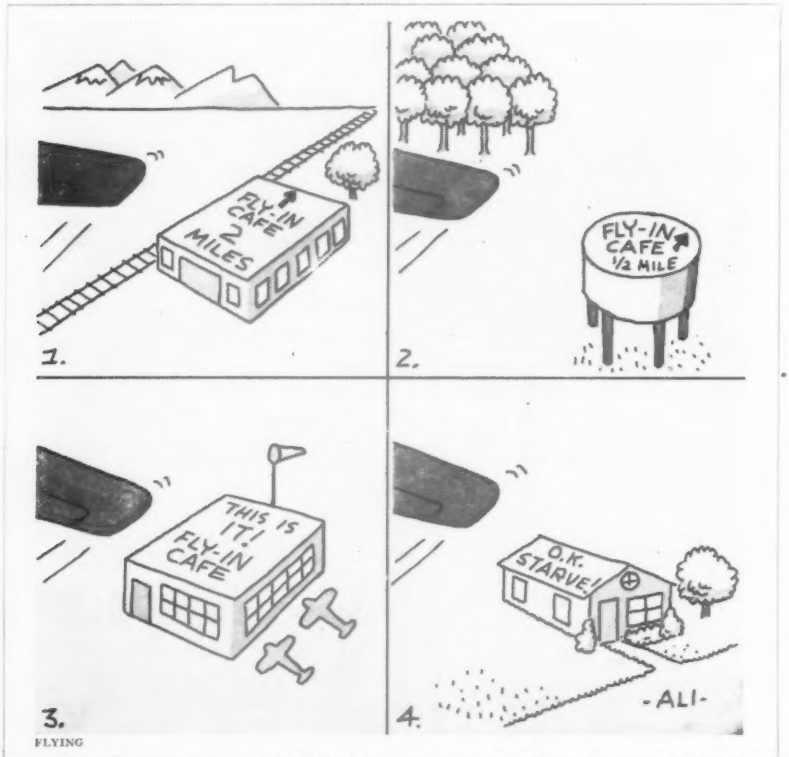
The instructor is a forgiving and an optimistic individual. He forgives himself if the landing was bad—and is optimistic about making a good one next time. So he pours the throttle on and when they are comfortably airborne the student must pull up the wheels for him. When the student grabs the flap handle and smartly retracts the flaps at 50 feet the instructor sweats, works, and prays as they miss the tall pine trees by inches.

There are some excellent students who don't pull bone-headed tricks. There are many average ones who pull just a few. The Navy, however, does have its percentage of knuckleheads. They all make mistakes, and it is expected. The student isn't particularly perturbed over his errors. In his happy infancy he can hardly be expected to scare himself. Pushing and pulling the stick the wrong way, kicking the rudder around like an old football, all of these little mistakes make stalls very difficult to teach. Not only that, it scares hell out of the poor instructor.

The student sometimes freezes on the controls in a spin. The movie industry in Hollywood usually has the instructor conk the student on the head with a fire extinguisher. The SNJ has a fire extinguisher in the rear seat but, try as he may, the instructor simply cannot reach the skull of his student with it. The accepted method of recovery in this situation is for the instructor to get MORE scared than the student and overpower him.

After a particularly rough ride the instructor still has hopes. Maybe the student will make a good final landing at the home field. The unwary instructor, in this unusual case, might permit himself the luxury of relaxing for one brief second. Unfortunately, if he were to allow himself a second of quiet bliss he would look up only to find himself being ground looped viciously across the runway.

The poor instructor isn't a bit surprised when the commanding officer calls him in and tells him what a complete and thorough knucklehead *he* is. He has long ago learned to expect anything. You can barely see the little beads of perspiration break out on his forehead when the CO informs him that he is hereby assigned to night flying for the next two weeks. Night flying from the back seat, you understand! END



FLYING

Planes Stop Subs?

(*Continued from page* 14)

with a wistful ring. Torpedo Junction at the northwest approaches of the British Isles was a ship's graveyard.

Favorite pastime of crafty Admiral Doenitz, czar of the German sub command, was to post a line of picket submarines just out of range of U. S. coastal aircraft patrols. When a Europe-bound convoy was spotted at least one U-boat would shadow it. Messages containing course and speed data would be radioed back to Doenitz. German operations officers would vector subs to rendezvous in groups ahead of the convoy. At night these Wolf Packs would crash through convoy screens in quick succession at high speeds and blast away with all torpedoes. Some packs ravaged convoys for days—trailing during daylight hours, striking by night—until the seas were strewn with wreckage and drowned men.

It was a crucial period. General Marshall said, "I am fearful that another month or two of this will so cripple our means of transport that we will be unable to bring sufficient men and planes to bear against the enemy in critical theaters to exercise a determining influence on the war."

Eventually it was the *Jeep* carrier which proved to be our greatest help. These carriers, with their radar-equipped planes operating as part of convoys and Hunter Killer forces, sent the Wolf Packs yelping for Baltic shores. Stretching protective screens around merchant ships 200 and 300 miles from convoy centers, they closed the gaps between landbased air in England, Iceland, Newfoundland and the United States. U-boats could no longer shadow and attack on the surface. Doenitz' convoy plotting-board operators couldn't get data. Nazi sub tactics lost their calculated precision and degenerated into a hit and miss affair.

Autumn, 1943, found the U-boat danger greatly diminished. By then Doenitz and his wolves were hard pressed to operate at all. Afraid to come out in force, they sulked in their lairs and began to devise a different and more crafty approach. That's when the modern snorkel sub was born. Fortunately, the Germans couldn't build enough of these before the war ended to do us any decisive damage.

Paralleling the period after World War I Armistice, Navy planners have been challenged by this shift in sub design to improve their anti-submarine weapons and tactics. However, there's nothing really new or magical about the snorkel. Earliest built submarines employed similar devices to suck air down into their crude interiors. Actually, use of snorkeling equipment is another concession to the airplane. Subs can't operate as efficiently at continuous periscope depth as they could using early World War II Wolf Pack tactics.

A submarine that must stay under the surface virtually all the time is enormously handicapped. There's still plenty of punch left but it's tougher to get the opponent within reach to let him have it. Navigation isn't as accurate, communica-

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tions are impaired, and searching for prey and maneuvering into position for the kill is a much more difficult proposition. Sub captains would toss their snorkels over the side if they weren't afraid of airplanes.

But this isn't the whole story by a long shot, because the snorkel is only one aspect of modern submarine design. With long-life batteries, beefed-up hulls, powerful engines and deadly armament, these new-type subs are dangerous weapons. Employed in war they could present as great a threat to U. S. sovereignty as the atomic bomb.

Today one nation is concentrating on the development of a powerful submarine navy. If production rates of that country should be upped to a level comparable with Germany's peak output of about 300 subs per year, a force many times larger than the size of the Nazi U-boat fleet in 1941 could be assembled in a very few years.

Any such force could mean big trouble. Used in war, individual subs of this fleet ranging along the U. S. coastline would make ideal weather stations and radio beacon localizers to aid bombers in attacking U. S. targets. They'd serve as efficient launching platforms to lob rockets and guided missiles capable of vast destruction into the heart of our cities. For enemy intelligence purposes, they would be made to order for landing spies and saboteurs and for collecting photo reconnaissance data and reports of undercover agents. As radar pickets stationed along air routes, they could radio information of U. S. bomber movements over the North Atlantic.

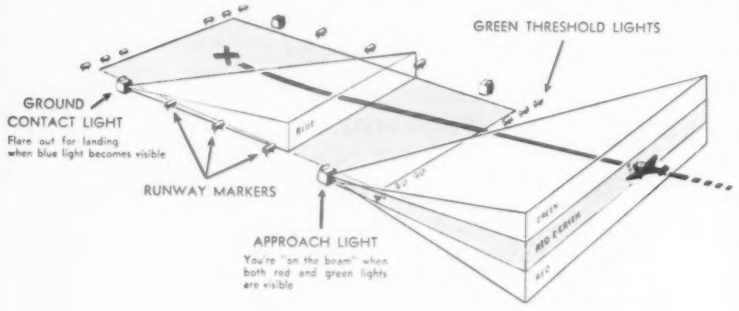
But their greatest threat would be against our Navy's ability to command the seas. Should U. S. ships be unable to make safe passage across the oceans, this nation would become a political island sealed off from the rest of the world, unable to enlist allies and powerless to impose decision. For the first time since British Red Coats landed at Chesapeake Bay in 1814 and burned our capitol in Washington, a foreign power could turn this continent into a battleground.

Without access to sea lanes we couldn't hope to support a single overseas base for any length of time. Transport planes wouldn't be able to do this job except over short distances. Foreign aid to encourage political and military cooperation, as called for under the Marshall Plan and the Atlantic Security Pact, would be an impossibility. And overseas sources of vital raw materials, like bauxite and manganese which are fundamental to the aluminum and steel industries, would be plugged up.

Crushing the submarine menace, then, becomes pretty fundamental. The Navy needs all kinds of weapons to carry out its anti-submarine responsibilities. Each of these weapons has its own unique characteristics.

Landbased bombers, for instance, don't appear to be obvious Navy weapons but they have their own vital role to play in controlling the seas. They are easily loaded in permanent depots. Their large weight-carrying capacities allow engineers to stuff them with all kinds of complicated electronic detection devices. Ability to lug big bombs needed to get at deep-diving submarines and to haul plenty of gasoline for endurance all adds up to making them tough for submariners to deal with. Currently, the Lockheed *Neptune* (P2V), holder of the world's distance record, is the Navy's No. 1 big anti-sub bomber. It will soon be augmented by the Martin *Mercator*, (P4M) a slightly larger and more powerful plane than the P2V, fitted with two 3,250-h.p. reciprocating engines and two 4,000-pound thrust jet engines.

Complementing these landbased bombers in the air defensive picture are planes like the Grumman *Guardian*. Described as the largest single-engined air-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RUNWAY MARKERS
APPROACH LIGHT
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LANDING BY COLORED LIGHTS

THE SKY was heavily overcast and everything below was black as we approached the small airport in a Stinson *Voyager* at night.

Earl Hoffman, vice-president in charge of sales of the Aviation Equipment Company of St. Louis, was ready to demonstrate his firm's new Airport Landing Light System.

"Just line up with the runway, keep the red and green together," he said. "When you see the blue light, begin to flare off and you'll grease her in for a perfect landing."

I made the turn for final approach. Ahead was the runway—three white lights on the sides and two green lights on each end. But something new had been added. Left of the runway near the first marker light were two lights, so close together they appeared as one, with green showing on top and red on the bottom. These were "glide path" lights and they indicated that I was at the proper altitude for my distance from the runway. If I followed them, they'd take me right down to the end of the runway.

To see how the lights worked, I climbed slightly. Soon the red disappeared and only the green light showed. That told me I was too high. I cut the throttle, slowed my glide slightly and let the plane sink. Soon the red re-appeared with the green, but as the plane continued to sink, the green disappeared. The remaining red light indicated I was too low. I climbed until the green reappeared with the red, and renewed the glide.

We passed the green markers at the end of the runway, and neared the red and green lights. They became distinct, and suddenly we passed them. At that instant, down the runway on the left, appeared a blue light. I broke my glide, as I'd been instructed to do, and flared off as the blue light became intense.

We touched and rolled. A perfect three-point! Though the plane's landing lights had been on, I'd been too busy watching the colored lights to look for the ground.

All lights are neon tubes. Though they lack an intensity control, they can be seen for at least 10 miles on a clear night. The approach (or glide path) unit is a sheet metal box about 30 inches high with two louvered slots cut in front, one showing a green and the other a red light. These are pre-adjusted to give an ideal 1-to-7 glide path, but can be set at other ratios for heavier planes or to clear obstructions. The ground contact unit is the same size but has only one slot which shows a blue light, set so a pilot sees it only when he should begin to stall the plane for a landing. It is placed as far up the runway (up to 2,000 feet) as possible.

On the top and rear of each unit is a white runway marker light. Another single runway marker unit is set up halfway between the approach and contact units. Green threshold markers are the same as the single runway markers except for color.

The basic system sells for $1,500, including wire. Current consumption is about 600 watts per hour, or less than an ordinary electric iron. On large field installations, if CAA approval is necessary, the requirements of CAA technical standard order N1 must be met.

—Richard E. Stockwell

craft in the world, this plane is currently going through its paces in preparation for operations aboard *Jeep* carriers. Plans are to work planes like these in pairs, one model equipped with special radar gear to find subs and the other armed with depth charges to kill them.

In contrast to these aggressive weapons, the lumbering airship also has a lot to contribute, as borne out by recent mock skirmishes with subs. Particularly important is its ability to hover in relative silence while listening for submarine propeller sounds relayed from sonar devices. These comparatively weak signals are picked up by microphones floating on the ocean's surface. They are more easily distinguished in airships than airplanes because there is less vibration and noise. Ability to carry large amounts of bulky radar gear and plenty of operators to man it is another feature which airship protagonists brag about. While it's true that airships make first-rate targets, they are not in any real danger as long as they're employed near friendly coast lines or with airplanes in Hunter Killer Forces.

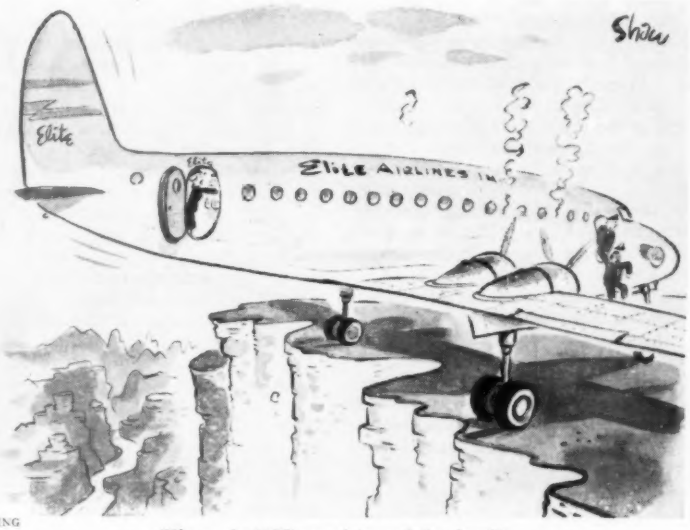
For surface submarine hunting, the destroyer is still king. Best talent of this fast maneuvering ship is playing watch dog for larger ships. Dozens of them are used to ring convoys. Sonar soundings are the destroyer's speciality. With supersensitive directional devices lashed to the bottom-side of its hull to pick up underwater noises, it is fitted to locate subs attempting to sneak past screens for attacks on laden ships in the heart of the convoy. Regardless of weather or sea conditions, destroyers can hold out with the best of them.

One entirely new weapon the Navy is developing is the anti-sub submarine. Outstanding forte of this underwater sleuth is its ability to maintain perfect silence while listening for enemy subs, and to move up and down like an elevator to get better bearings. Because sound waves are bent by water currents of varying temperatures, this is a real asset. Current plans are to use it as a sentinel posted outside enemy harbors so that it can keep tabs on submarine traffic.

To blast sub pens, the Navy is grooming planes like the North American AJ-1. Slightly smaller than the *Neptune*, this plane is powered by two reciprocating engines located in wing nacelles and one turbojet placed inside the tail section. For better maneuverability on aircraft carrier decks, the tail section and outer wing panels are fitted to fold out of the way. Fighters, too, should see plenty of action in this tactical bombing job. Rocket-carrying jet planes like the McDonnell *Banshee* (F2H), the Chance Vought *Cutlass* (XF7U) and the powerful, twin-jet all weather Douglas *Skyknight* (XF3D) would probably be called in to help.

The Navy is learning all the time. And whatever develops in this business of stalking submarines, the airplane is bound to remain the nucleus of the anti-sub team. It has many natural advantages denied to surface craft such as speed, cheapness, large field of vision, and economy of personnel and material. Almost every so-called advance in submarine design has actually been a defensive change to protect it from planes.

Radar equipment now being tested is much more powerful than the World War II variety and, under favorable conditions, is even sensitive enough to pick up the relatively small areas offered by snorkel tops. However, sonar and magnetic detection gear will have to take the main burden of underwater search. Airplanes will continue their old job of hunting for unwary subs and keeping them under the surface by using improved radar equipment and sonar devices. This kind of work is grueling and strictly unglamorous. Big offensive task of anti-submarine planes will be bombing enemy sub pens and mining harbors. There would be enough action here to provide a vital role for any navy pilots. END



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"AVIATION EDUCATION DAY"

OVER 7,000 persons flocked to the Nicolet Airport in DePere, Wis., recently during its "Aviation Education Day."

Ten private planes were kept busy all day giving free rides to more than 500 persons. (V-shaped line in above photo is part of crowd waiting for rides.)

Other attractions were a model plane meet and aviation exhibits prepared by the CAP's Junior Squadron.

Sponsored by the Wisconsin Civil Air Corps, DePere's Aviation Education Day paid its own way. Concessions operated on the airport paid off the gas, insurance and incidental expenses—with $12 to spare. Crowds were attracted by free newspaper and radio publicity.

'Smilin' Zack'

(*Continued from page 25*)

"clubman," he belongs to the Airplane Owners and Pilots Association, Sportsman Pilots Association, Aviation Writers Association, and the exclusive Quiet Birdmen.

Unlike some cartoonists, Mosley writes his own story line. During the war "Smilin' Jack" stories, frequently crammed with military aviation action, were treated like news from the battlefronts and cleared with military censors before publication.

Although "Smilin' Jack" action occasionally moves away from the airport scene, Mosley retains the aviation theme by picturing planes swooping low over the characters wherever they may be. By using birds' eye viewpoints, Mosley fills two-thirds of a picture panel with a high-flying plane while his characters are mere dots, far in the background.

Most "Smilin' Jack" planes are real civilian or military ships drawn in detail to the last trim tab. It was Mosley's own Beech, NC 11111, that Smilin' Jack was flying the day his voluptuous passenger, Miss Missile, got the drop on him with a gat she pulled out of her hair-do.

Mosley makes it a point to explain aeronautical methods, terms, and devices to non-airwise readers. At times Jack is left in the clutches of a villain for two or three days while Downwind and Sable take over the strip and, for reader enlightenment, discuss sky writing, range flying, weather lore, supersonic flying, or some other technical subject. Footnotes often clarify technical points for the readers.

Sometimes "kid" readers learn more than Mosley forsees. Two years ago two 12-year-old Kansans "borrowed" a lightplane at their local airport while no one was looking. They flew the plane around for over an hour, got lost, and miraculously made a safe landing in a pasture. They had never received flight instruction, they told investigating airport authorities, but they had "learned all about aviation" from Mosley's educational comic strips.

Years before Pearl Harbor, Mosley was plugging for a strong air force. When World War II came he went to work in earnest.

The procedure for joining the Air Corps was graphically presented to able-bodied male readers when Smilin' Jack's brother Stretch became a flying cadet.

But publicity for the Civil Air Patrol was the Mosley forte. While Smilin' Jack was off with the AAF, Downwind and Cindy were flying anti-submarine patrol missions for the CAP.

Mosley himself joined the volunteer defense organization four days before Pearl Harbor, rose to the rank of lieutenant colonel, and served two years as Florida Wing Commander.

GI's at South American and Caribbean area Air Transport Command bases heard the famous Mosley stories firsthand in 1942 when the ATC borrowed him from CAP for a "special assignment"—soldier entertainment.

Following the war, Mosley and "Smilin' Jack" took up the cause of private flying. Jack screamed, in big black letters that could be read by any congressman, for more and better radio range and weather reporting facilities when he got lost while flying a lightplane one stormy day.

When the GI Bill of Rights Flight Training Program became bogged down in red tape in Washington, D. C., Mosley added his bit to the widespread controversy on the subject. Downwind and Jack plugged earnestly for the program through a four-panel episode which ended with one of Mosley's favorite sentiments springing pungently from Jack's mouth: "More flying helps build a healthier aviation industry, which is vital to the defense of the country."

Mosley's plugs run thickest at the height of the summer air show, air-tour, model-contest season. "Smilin' Jack" readers can't fail to notice the announcements of these aviation events that appear throughout the strip on hangar walls, plane cowls, carrier decks, and Downwind's shirt-tail.

Mosley's many promotional efforts haven't gone unnoticed in the higher echelons of civilian and military aviation. Among the acknowledgements made of his work is one he especially prizes—a Naval Air Certificate of Merit commending him for his "keen and active interest in the Naval Air Reserve Training Program as a vital portion of national defense." Mosley was the first civilian recipient of such an award, which, signed by an admiral, was presented him before an audience of 20,000 persons at a Jacksonville, Fla., air show last year. He was also presented with an Air Medal for his anti-sub patrol work.

At pilots' conventions and banquets, aviation trade meetings, and air shows throughout the country, Mosley is a familiar figure. After arriving in his own plane, he sets to work sketching the latest planes on exhibition and quizzing everyone from mechanics to engineers and board chairmen—all for more "Smilin' Jack" material. Frequently he finds himself pressed into committee service. An obliging fellow, he admits he enjoys this work, "especially when it's a committee to select a 'Miss Supersonic Lassie' or 'Miss Tennessee Aviation.'"

But Mosley's aviation interests never interfere with his comic strip production. To turn out a week of "Smilin' Jack" requires about 140 man-hours of art work—obviously too much for one man. Though he entrusts minor art details—lettering, shading, and background drawing—to two assistant artists (Alex Delich and his brother, Bob "Stretch" Mosley), he never has time to venture far from his drawing board. So, when he wants to spend a few days at the air races at Cleveland or at a west coast flying farmers' convention, he puts wings on his studio. With his assistants and their drawing equipment aboard the four-passenger Cessna, he takes off. "Smilin' Jack" has been drawn in hotel rooms from coast to coast. END

"Shot Down" Planes

(*Continued from page 20*)

numerous, pressed with the determination previously observed in northwest Europe. Claims against enemy aircraft were 62 destroyed, 24 probably destroyed, and 27 damaged.

Once again the German records fail to support American claims. German losses (exclusive of those obviously not the result of AAF action) were 19 fighters destroyed and 13 damaged in combat, with one other destroyed and two damaged for reasons not directly charged to "enemy action." This was the maximum possible destruction that could have been credited to the Americans, since a few of the losses might possibly have been caused by the RAF night attack.

In the great Schweinfurt mission of October 14, 1943, the 8th lost 60 B-17's and crews, to say nothing of the major damage suffered by 17 aircraft and the repairable damage sustained by 121. As a partial offset to these losses were claims of 186 enemy fighters destroyed.

German Air Force records again tell a different story. They show total combat losses for the day, exclusive of those obviously not attributable to AAF action, of 38 fighters destroyed in combat and 20 damaged. Five fighters destroyed and 11 damaged for reasons not attributed to "enemy action" could possibly be added to those totals.

The period of analysis covered here runs only from August, 1942, to December, 1943. While the reports continued to be inaccurate up to the end of the year, they seem to be less so as time passed and crews and intelligence officers acquired additional experience in evaluating the claims.

The chief sources of these enormous errors were easily diagnosed. It was difficult for crews in a large formation to determine which bomber had been responsible for a shot-down German plane. Each gunner who fired at the enemy craft from a reasonable range was likely to claim it. One fighter actually shot down might be multiplied into a dozen in the final report.

The crew member who claimed the kill could hardly qualify as a detached and uninterested witness. His battle station vision was extremely limited and his impressions of a complex and incredibly swift action necessarily were faulty and incomplete. Nor did the promise of a decoration for his first kill of a German plane tend to discourage him from claiming that it was his bullet which had downed the craft.

These difficulties appear obvious in retrospect but they presented a problem for which the interrogating officers had not been fully prepared. As late as August 24, 1942, the training manual on bomber crew interrogation did not even suggest, as part of the check list of questions, the query, "Were there other bombers firing at the enemy fighter claimed as destroyed?" This question soon became the most important part of the interrogation.

Aroused by the improbability of the Lille claims, the 8th Bomber Command made a prompt attempt to tighten up the interrogation procedure. The pattern of any considerable battle was exceedingly difficult to re-create. By the end of the year it was becoming common practice to diagram all combats resulting in claims.

Finally, on January 5, 1943, the 8th Bomber Command headquarters issued the following rules governing evaluations. An enemy plane would be counted as destroyed when seen to disintegrate in the air or when the complete wing or tail assembly had been shot away from the fuselage, but not if a wheel or some other part of the airplane had been shot away. Single-engined enemy planes would be counted destroyed if the pilot had been seen to bail out. The "probably destroyed" category would include planes for which no certainty of destruction existed but where the intensity of flames or extent of damage seemed to preclude chance of a successful landing. An enemy plane could be claimed as damaged when any of its parts were seen shot away. Every effort would be made to reduce future claims and to eliminate crediting the same German fighter to two or more gunners.

In accordance with these principles, claims registered since the beginning of operations were reviewed. By previous standards, claims for all missions through January 3, 1943, had totalled 223 shot down, 88 probably destroyed, and 99 damaged. The new yardstick set them at 89 destroyed, 140 as probably destroyed and 47 damaged, a revision which did much to satisfy critics on both sides of the Atlantic. Even so, the figures were still too high. Even under the directive of January 5, claims continued to be often inaccurate and seldom on the conservative side.

The failure to develop a more reliable method of estimating enemy losses was of grave significance. Inevitably public relations were involved. It is difficult to avoid the conclusion that the evaluations, especially in the early days, reflected a natural desire to prove the case for daylight bombing.

Inflated reports, widely published, sometimes had to be corrected to the embarrassment of the AAF. But the figures on German Air Force losses, however newsworthy, were not collected to adorn headlines. They constituted a type of intelligence indispensable for the strategic planner. Claims continued to run excessively high, but in general the mistakes seem to have arisen from an honest failure to solve the problem of reporting and evaluating a most complex operation.

By the fall of 1943, the curve of German fighter aircraft production was rising, even though German craft were being lost in steadily increasing numbers.

In October, 1943, a report by the intelligence section of the 8th Air Force, covering the first 12 months of American operations from the United Kingdom, indicated a sharp discrepancy between British estimates of German Air Force strength, wastage and production (which were the only such estimates available) and American claims of enemy planes destroyed on daylight bombardment missions.

The Americans claimed to have destroyed more single engined fighters during this period than the British believed were lost by the enemy on the western front from all causes. The trouble could have arisen from errors either in estimated production, estimated wastage, or estimated strength. The first was naturally difficult to check accurately. The second was a category in which the American force had admittedly been far from accurate in the past despite every effort to be conservative. On the third matter, that of frontline strength, it was

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possible to provide a rough but convincing check through the reports of American bomber crews, which generally confirmed British estimates.

"We know," the report declared, "that fighter strength on the Western front is increasing." It concluded that, while British figures on production and wastage might be conservative, American claims of enemy fighters destroyed were undoubtedly too high.

The seriousness of mistaken intelligence estimates is obvious. On October 14, General Arnold cabled General Eaker that, according to the evidence as it appeared in Washington, the GAF was on the verge of collapse and that the situation should be carefully investigated. Eaker, whose bombers on that very day had been frightfully mauled by the German fighters on their way to and from Schweinfurt, was nevertheless able to reply with restrained confidence (thinking no doubt of the 186 enemy aircraft *claimed* destroyed): "There is not the slightest question but that we now have our teeth in the Hun Air Force's neck." The battle of the 14th, serious as it was, he likened to the "last final struggle of a monster in his death throes."

On more mature deliberation he cabled Arnold to the effect that, although the German Air Force appeared to be operating under a severe strain which might ultimately lead to a breakdown, no evidence pointed to an early collapse.

Eighth Air Force opinion during the remaining weeks of the year tended to concentrate more and more on the sobering fact that the German fighter force in the west was increasing rather than decreasing in absolute strength. It was known that the enemy was on the defensive and had since October put into effect a strict policy of conservation in order to reduce the rate of attrition suffered during the summer and early fall. But by January, 1944, it was becoming increasingly apparent that the German fighter force was being fed by a rapidly accelerating rate of aircraft production.

There was concern also about the improvement in performance among German fighters. One observer felt that this improvement in performance would be enough by the spring of 1944 to overcome the advantage even of the improved American fighter planes. A report dated January 5 concluded that the entire American daylight bombing program against strategic objectives located deep in Germany would be seriously threatened unless effective steps were soon taken to reduce the enemy's fighter force both in quantity and quality.

This anxiety was soon reflected in Washington where, except for an incredibly naive report issued by the office of AC/AS, Intelligence on October 18 which stated that "aerial supremacy on a continental scale has been won," opinion came to be colored less and less by the tendency toward wishful thinking that had sometimes marked it. END

DeHavilland Beaver

(*Continued from page 34*)

had a chance to give the plane a workout at Roosevelt Field, L. I.

A preflight inspection of the airplane can be made in a quick circuit outside the airplane. I thought the most unusual feature of the *Beaver* was the placement of fuel tanks and battery. Provision for one man operation governs the placement of inspection and minor maintenance items. The three fuel tanks (with an 87 gallon total capacity in the standard model) are located under the cabin floor, putting the filler necks within easy reach of the ground or floats. The battery slides out on a tray, waist level, on the port side of the fuselage, rear of the cabin door, for quick servicing. The battery connections are made automatically by spring contacts when the tray is pushed in.

The *Beaver* shows evidence of the careful engineering which would warrant its list price of $25,300 (f.a.f. Toronto). The high purchase price will quickly limit the "personal plane" market to the luxury bracket sportsman who follows his fishing and hunting around the seasons, where the gain in utility will be worth the high capital outlay. However, for the bush operator, the *Beaver* can be a very practical and profitable choice.

No one would put a 450-h.p., seven-place, 1875-pound useful load capacity airplane on a route which a four-place, 200-h.p. airplane could service. The *Beaver* must be used in territory where other airplane equipment fails to meet the rugged operation requirements. DeHavilland has estimated a low 12 cents per mile operation cost for the *Beaver* based on 80 hours per month flying time. Included in this figure is depreciation, pilot's salary, gas and oil, direct maintenance costs. DeHavilland claims that in almost two years of operating 60 *Beavers* the parts shipped from the factory have totaled less than $2,000.

I had a good opportunity to check the short field performance of the *Beaver*. Temperature was 90°, pressure altitude 100 feet, and there was a 20° right cross wind at eight m.p.h. I ran through the starting procedure quickly, finding the controls within easy reach and logically arranged: flight instruments in front of the pilot, engine instruments grouped on the pedestal (actually the center of the panel), and radio and service switches on the far right. Cockpit design is simple and functional, providing maximum comfort for the pilot. The parking brake is set by a lever at the pilot's left at the bottom of the panel, "gas on" and tank selection made with the same hand on the panel just above the brake.

I used the wobble pump, located at the bottom of the pedestal, to bring the fuel pressure to five pounds, and primed the engine with my left hand, primer located ahead of the seat on the left just aft of the entrance door. With the master switch at the top of the instrument panel at the far left ON; and prop back, throttle cracked, mixture auto rich, I flipped the mag and booster switches at the lower left of the flight instruments where the starter toggles are located.

As the oil pressure rose after starting, I moved the prop forward to low pitch. The prop, throttle, and mixture controls at

De Havilland Beaver

	LAND PLANE	SKI PLANE	SEAPLANE
PERFORMANCE:			
max. speed (sea level) TRUE	171 m.p.h.	153 m.p.h.	155 m.p.h.
cruising speed " " 67% power	148 m.p.h	128 m.p.h.	132 m.p.h.
economical cruise " " 53% power	133 m.p.h.	116 m.p.h.	120 m.p.h.
max. climb (sea level) TRUE	1,310 f.p.m.	1,260 f.p.m.	1,200 f.p.m.
take-off (sea level, zero wind, 30° flaps)	11 sec. 550 ft.		15.5 sec. 775 ft.
stalling speed (indicated) flaps up	59 m.p.h.	59 m.p.h.	59 m.p.h.
flaps down—45°	47 m.p.h.	47 m.p.h.	47 m.p.h.
service ceiling	26,000 ft.	23,000 ft.	23,000 ft.
absolute ceiling	28,000 ft.	25,000 ft.	25,000 ft.
WEIGHT EMPTY	2,775 lbs.	3,022 lbs.	3,083 lbs.
GROSS WEIGHT	4,650 lbs.	4,820 lbs.	4,820 lbs.
PAYLOAD—with 500 mile range	1,205 lbs.	1,076 lbs.	1,015 lbs.
LENGTH	30 ft. 3 in.		32 ft. 9 in.
HEIGHT	10 ft. 7 in.		12 ft. 1 in.
WING SPAN	48 ft.	48 ft.	48 ft.

WING AREA	250 sq. ft.
WHEEL TRACK	122 in.
FLOAT TRACK	114.75 in.
CABIN Width	4 ft.
Height	4 ft. 3 in.
Length	9 ft.
Volume	150 cu. ft.
Emergency stowage volume	9 cu. ft.
Max. width cabin door	3 ft. 3 in.
Max. height cabin door	3 ft. 4 in.
ENGINE	Pratt & Whitney Wasp Jr. R-985-AN6B rated 450 b.h.p. @ 2300 r.p.m. 36.5-in. Hg. at sea level
FUEL	87 octane
PROPELLER	Hamilton Standard 2D30 2 Blade Constant Speed
ELECTRICAL SYSTEM	24 volt

the top of the pedestal are all of different color and shape as adopted by the Standard cockpit board to reduce the possibility of mistaken identity when the pilot is under pressure. Friction locks of corresponding color are below each of these controls. The oil temperature gauge registers in fahrenheit, as does the cylinder head temperature. The fuel gauge is electric.

Flap selector switch is on the floor to the right of the pilot's seat and when position selection is made a hand pump next to the selector switch actuates the hydraulically operated system. The elevator trim tab is reached comfortably at the center of the cockpit ceiling. An aperiodic compass is mounted in front of the pilot in such a position that parallax error in reading is at a minimum. Rate of climb and gyro instruments are optional equipment. Brake system is hydraulically operated with toe brakes above the rudder pedals.

The de Havilland engineers have found a solution to everything, it seems. In case the battery is inoperative, one man starting operation is still possible by locating inside the cockpit a hand engager and a switch, which disengages the starter brushes from the commutator. Thus, the pilot can crank the airplane from the outside, which could almost be done by leaning forward from his seat, and then flip the engager switch from his seat, and be ready to go in a matter of seconds, with no help needed.

The windshield has a defroster but no de-icer boot installation is planned by the manufacturers.

I taxied out for take-off and despite the cross wind found the wide tread landing gear and large rudder area afforded good control of the airplane at slow speeds by use of rudder alone. I lowered 30° of flaps for take-off and opened the throttle. At full power of 36½ inches, 2,300 r.p.m. was developed. The airplane accelerated straight down the runway and, with slight back pressure after a six-second run, the *Beaver* was off in about 500 feet as the airspeed needle neared 55 m.p.h. In a 1,300 f.p.m. initial climb at 72 m.p.h., I was at 600 foot altitude when over the far end of the 2,500-foot runway. Climbing power is 30 inches, 2,000 r.p.m. Rate of climb for the *Beaver* is actually some 25 f.p.m. higher without flaps; maximum angle of climb (used to clear obstacles in immediate take-off area) is best at 30° flaps. The usual procedure of raising flaps after a short field take-off for better climb performance is thus not necessary with the *Beaver*.

Pilot visibility in the air is excellent, with the topmost edge of the cowling resting just slightly above the horizon in level flight. Large cabin window area gives good visibility sideward and to the rear. On the ground, I could see a point within 20 feet in front of the airplane nose; it was a comfortable feeling to be able to see easily where I was taxiing.

Economical cruise is given in the books as 53 per cent power—240 brake h.p.—at a setting of 1,650 r.p.m. and 28 inches. This will give a true airspeed of 133 m.p.h. at sea level and 137.5 m.p.h. at 5,000 feet. At this setting, the particular airplane I flew cruised just under 130 m.p.h. indicated at 1,500 feet.

I found the control forces in the *Beaver* to be surprisingly light. No friction was detectable in the control system and control response was quick. Good directional stability is given by the large fin area. When I displaced the elevator control longitudinally by a quick shove, the oscillations damped out in one cycle, showing desirable longitudinal stability. When displaced laterally with rudders fixed, the wing was depressed and then slowly returned to level flight, indicating positive dihedral effect.

The weather was very gusty so that I had a good chance to give the plane a riding test. The *Beaver* flew steadily hands off and is heavy enough—18.6 wing loading—to give a smooth ride. The handling qualities of the plane exhibit desirable characteristics and should minimize pilot fatigue. The only adverse feature I could find on the check flight was the successful cabin "winterization" which kept temperatures at an uncomfortably high level. Future models for the States, I am assured, will have additional cabin ventilation.

The airplane is particularly adaptable to slow flight and will fly at 40 m.p.h. indicated with full flaps, 18 inches manifold pressure, with good positive aileron control. At this speed and power setting, I held the wheel almost full back and still registered a 200-f.p.m. climb, with a noticeable tendency to fall off to the left because of torque. The airplane has good lateral control at stalling speeds and will not "break" except at the most rearward c.g. loading. Holding the wheel hard back, power off, full flaps, it was in a stalled condition showing 47 m.p.h. indicated airspeed, a 900 f.p.m. rate of sink, but nose high in the air.

Holding it in this position, I rolled the airplane sharply to the right. The right wing was depressed momentarily, then returned level. In tight turns, adequate stall warning was given by conspicuous buffeting. The plane has excellent stall characteristics. In an inadvertent stall at low altitude the nose would not drop out but would allow the airplane to hit nose high, with the landing gear taking up some of the shock.

In approaching the field for a landing, I used a glide speed of 75 m.p.h. indicated, giving a 500 f.p.m. descent. At this speed, the airplane will float sufficiently to allow smooth landing. At 60 m.p.h., the rate of descent is steep enough to require expert piloting to round out for an easy landing. I selected 45° of flaps, pumped them down, and straightened out on the approach. This gave a steep approach angle with good visibility along the nose. Over-the-fence at 70 m.p.h. and rounding out for the touch down with easy back pressure, contact with the runway was made at 50 m.p.h.

The cross wind and gusts required alert brake control to keep the airplane rolling straight down the runway until speed was lost. With use of brakes, I found no turnover tendency and landing roll was completed in 600 feet. If I had been more familiar with the airplane, landing and take-off could have been made in much

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A7-3A	Transm. VHF incl. antenna & switch General Electric	132.00	79.00
VTA-1	Transm. VHF-Narco	104.00	62.00
	Interphone Set, 2-way, 1-tube, dry Battery oper.	45.00	15.00
ANBH-1	Head Set	15.25	3.75
T17B	Mike	18.00	3.50

PROPELLER SPECIALS

MFR.	DESIGN	List Price	SALE PRICE
Fahlin	565-50 Aircraft Powered by Franklin 65 HP.	$ 44.50	$20.00
Fahlin	560-A1-56 Lycoming 75 Funk	49.50	20.00
Fahlin	566-47 Lycoming 65 Luscombe and Taylorcraft	44.50	20.00
Fahlin	575-A-49 Cont. C75 Ercoupe	53.20	20.00
Fahlin	44K24605 UC-78.	100.00	6.95
Sensenich	98AA64 PT17A & PT13	100.00	25.00

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READING	WEIGHT	SIZE	List Price	SALE PRICE
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324L, 6V 24AH	12 lbs.	5¼x5⅝x8	25.60	15.00
R-55, 12V 55AH	36 lbs.	10¼x5¼x12	54.55	40.91
R-37, 12V 37AH	36 lbs.	10¼x5¼x12	45.95	34.46
R-33, 12V 33AH	28 lbs.	10¼x5¼x8	41.25	30.94
R-24, 12V 24AH	24 lbs.	10¼x5¼x8	36.00	27.00
S-24, 12V 24AH	22 lbs.	7¾x5¼x8	34.00	25.50
R-19, 12V 19AH	20 lbs.	7½x5x7⅝	34.40	25.80
S-12, 12V 12AH	15 lbs.	7¾x5¼x8	31.35	23.51

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less distance. In an acceptance test recently at one of the military bases in this country, a *Beaver* was flown at 4,800 pounds gross (150 pounds overload) and took off into a 7½ m.p.h. cross wind, ground temperature 80°. It required only 850 feet to "clear an obstacle 50 feet high."

That's performance that will tempt any utility minded operators and, unusually enough, such performance is not at the sacrifice of pilot comfort or confidence. The handling of the airplane actually is simple and very consistent and the *Beaver* could be nicely managed by a moderately experienced lightplane pilot, with some help on the gadget management necessary for 450 h.p. operation.

The outstanding bush pilots in Canada actually had a hand in developing the *Beaver*. Surveying the pilots by mail, de Havilland sent out a preliminary questionnaire which showed that equipment available at that time was unsatisfactory in the following respects:

1. Could not operate in small clearings or lakes.
2. Needed several men to service, dock and load properly.
3. Was not all-metal.

When these gripes were satisfactorily overcome in the prototype, the bush pilots were called into the factory where discussion and testing continued until the *Beaver* was as free as possible from almost every conceivable chronic U.R. (unsatisfactory report).

U.S. manufacturers could well note this novel way of predetermining pilot acceptance—it pays off. Not only does every *Beaver* pilot become a *Beaver* enthusiast, but the enthusiasm has been reflected in sales. In less than two years, *Beaver* sales have written off all engineering and production costs to date. END

Lightplane Airlines

(*Continued from page 17*)

help keep the operating costs down.

Inactive feederlines had been under pressure from the Civil Aeronautics Board to start the services for which they had been certificated but, up to now, many of them have been reluctant to do so because feederlines as a group have been unprofitable and business has been less than expectations.

Advantages of the new CAB ruling are obvious. Power plant reliability of small planes had improved so much since the 1920's, when single-engined planes pioneered the nation's airways, that there is no comparison. The small planes are ideally suited for short field landings and take-offs which so far have kept many communities from receiving scheduled twin-engined service even if it were profitable for them. Millions of citizens thus have been deprived of airline service. In favorable terrain, to which the new lines are confined, even forced landings should not be serious.

The lightplane airlines will also give private flying a boost by helping airport operators, by providing additional business for manufacturers, and by making use of aircraft more widespread on the cross-roads of America.

It was the failure of six of the 18 temporarily certificated feederlines to complete operation plans by July 1 that convinced the Civil Aeronautics Board that something was wrong with the feederline setup. No planes had been specifically developed for feederline service and all existing equipment was disproportionately expensive to operate.

The CAB wanted the feederline concept to get a fair trial, hence gave the green light to the more economical single-engined planes. Actually, light twin-engined planes are also included. Officially, a "lightplane" is one that weighs not more than 12,500 pounds loaded.

The idea is strictly experimental, and the CAB is in a position to revoke its authority at any time. The regulation is only temporary and expires August 1, 1950, "unless sooner superseded or rescinded." The regulation reads as follows:

"The Administrator is hereby authorized to issue temporary air carrier operating certificates of one-year duration to scheduled air carriers holding temporary certificates of public convenience and necessity, authorizing the use of aircraft under 12,500 pounds maximum certificated take-off weight, in accordance with such certification and operating standards as may be established by the Administrator. Such certificates shall be called Air Carrier Operating Certificates for Local Areas."

It is proposed to establish the following requirements for scheduled operations under VFR conditions in nontransport-type aircraft:

1. A carrier could use any aircraft certificated as airworthy under the Administrator's limitations based on performance of the aircraft, terrain, and airports. No IFR or long overwater operations will be permitted.
2. Instead of two-way independent radio now prescribed, it is proposed to permit use of Government facilities for weather and flight plans which will be required. Company dispatching would not be required.
3. Maintenance requirements would be less detailed than Part 61; separate organization would not be required.
4. Co-pilots would not be required on single-engined aircraft and possibly not on some multi-engined craft. General flight regulations would apply.
5. Where no ground organization is maintained, pilot would assume responsibility for airworthiness and serviceability of the aircraft.
6. Weather minimums would be those prescribed in Part 60. Minimum day altitudes would be 500 feet, and for night as prescribed in Part 61.

These proposals are now being circulated, and from the comments upon them will emerge the final regulations. Amended rules are expected to become effective some time this autumn.

The Civil Aeronautics Board recently held pre-hearing conferences on applications for short-haul certificates by Val-Air Lines, Mercedes, Tex.; Carco Air Services, Albuquerque, N. M.; and Purdue Aeronautics Corporation, Lafayette, Ind. The first two have been operating intrastate with *Navions* and *Bonanzas* respectively. Purdue intends to fly its Cessna 190's between Lafayette and Chicago temporarily.

Additional lightplane operators are asking for certificates, including Albany Airways, Albany, Ga., with *Bonanzas;* East Texas Airlines, Longview, Tex., *Bonanzas;* Roscoe Charter Service, Salina, Kans., Cessna 195's. The first two are already operating intrastate and all three want certificates to carry mail, property, and passengers. Once favorable operations reports are received on the lightplane airlines, the business seems set to snowball.

Another encouragement to the single-engined airlines is the fact that the Post Office is nudging its star route bill through Congress. Star contractors receive a service fee per year, furnish their own aircraft, and carry all classes of mail on a set schedule. They can haul passenger and cargo at their own rates.

There is only one real star aerial route in operation. It serves several points and islands on the Lake Erie shore of Ohio and was authorized as an experiment by a provision in the Civil Aeronautics Act of 1938.

The present law says there shall be not more than five star air route contracts. It says also that routes shall not exceed 200 miles; shall not pay more than 20 cents per plane mile; shall not be owned by persons outside the region.

The new bill proposes to remove all

A FLYING TIP

SHADOWS

KNOWLEDGE of wind direction is essential on cross-country flights, but no information is available on winds aloft at a majority of airports. One helpful hint, if you are flying close to a cloud layer, is to watch the cloud shadows passing over the ground.

Ground shadows also help in traffic. If you can see your own shadow over the ground, glance around it occasionally for the shadows of other aircraft.

From "The Spare in Flying"
by FOSTER A. LANE

these restrictions but would provide the added restriction that no star run shall be established between points served by CAB-certificated airlines.

A gimmick in the present law has limited the number of star air routes. The Air Postal officials supposed that the words "five contracts" in the law meant five *routes*. But the Controller General's legal eagles say it meant five *contracts*. So the Ohio star route, having been renewed four times, is running out of renewals. That is the technicality that inspired the Post Office's present bill in Congress.

The Post Office seems to want freedom to expand the star air system. Assistant Postmaster General Paul Aiken does not want star air routes limited to regions where swamps, canyons, mountains or water barriers inhibit surface transportation. The star air route bill has been approved by the House Post Office and Civil Service Committee and the equivalent committee of the Senate has held hearings. Enactment this session is probable.

Star air services have one important advantage. They can be let or renewed quickly and simply without time-killing hearings.

They also have two disadvantages. They can be terminated equally as quickly. They can be ended at the end of a contract period or in the interim. In case of an interim termination, the carrier gets an extra month's pay. Nevertheless, the operator who has tied up extensive equipment could take quite a loss if he were banking too heavily on a star route contract. However, in the past the Postmaster General has been considerate of his obligations and the welfare of conscientious contractors.

Another disadvantage is that while surface star carriers can haul passengers and property at will, star air carriers may do so only if they are certificated by CAB. Certification of star carriers may enable them to bid low on mail, which will please the Post Office, and some prospective bidders are already applying for CAB certificates. They regard it as a good "in" to get a certificate.

The Air Transport Association, naturally, is opposing giving a free hand to the Post Office in awarding star routes. They don't want star air routes to take business from their member lines and have demanded before congress that the Post Office conduct hearings on star contract awards.

To this the Postoffice's Aiken has replied: "We might as well call off this service altogether if we are going to have to wait two or three years before we can award a contract."

If their star air system is authorized, the Air Postal Service officials say they may establish air routes between some points currently being served by boats or automobiles if the air would be faster. The problem is not exactly simple, however, because many of the boat and automobile services carry freight which could not be handled by lightplanes. Such services could not be abandoned.

The Post Office says that only about a dozen star routes are anticipated as a starter. The Air Postal Service wants to avoid contending with the CAB for control of short-line air services.

Meanwhile, with these two new experimental approaches scheduled for the immediate future, the outlook for lightplane airlines seems bright indeed. And it may get brighter.

CABoard member Harold A. Jones recently said that the airline system must have continuing heavy subsidy or it must be drastically reduced. The reduction necessary would cut out about 300 cities already served by the big scheduled lines. Evidence now indicates that they could be served profitably by the single-engined airliners.

Maybe new planes will have to be developed. But the next year will tell the story. To those old fogies who say that single-engined planes aren't safe for scheduled airline operation, one lightplane enthusiast made a classic rejoinder: "They're good enough for *people*, ain't they?"

END

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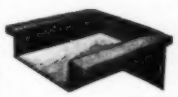

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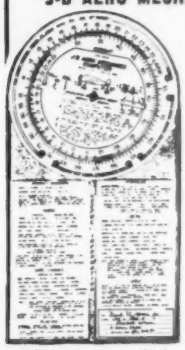

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The Mail Box

(Continued from page 6)

Since I was still north of the field and anxious to get in, I asked permission for a right-hand approach, which was granted. Reporting on base leg, I was given clearance to land, and on final noted my airspeed was almost 90 m.p.h. at 50 feet. I was just going to pull up the nose to cut speed when I hit a violent bump, my airspeed went down to almost zero, and the nose went down and the plane turned right. I was facing both down (sharply) and north.

Fortunately, I did the right thing—opened the throttle full, left the controls normal. Possibly I may have pushed the wheel forward. Anyway, at about 20 to 25 feet of altitude I came out with a lusty thump, turned left and landed.

. . . I *think* the change in wind direction resulted from a whirlwind which evidently came right down the runway, and being on the pavement naturally there was no dust to indicate its existence. I must have flown right smack into the downwind side of that whirlwind.

. . . believe me, I never approach a field at near stalling speed or without some power on. . . .

KEN BAILEY

Great Falls, Mont.

. . . I am a Swiss Army pilot with 10 years experience on Army aircraft and 15 years on sailplanes. A big part of my flights have been carried out in mountains where wind conditions have a great influence on landing technique. . . . At one particular airfield it happens sometimes that two layers of very strong wind of opposing direction are over the field. Making an approach under these conditions, the aircraft suddenly passes from the upper layer (tailwind) into the lower layer (upwind). As the change is almost instantaneous, the airspeed jumps from 150 kilometers per hour to 200 kilometers per hour in a Morane fighter plane, thus proving the theory of Captain Sheridan.

As this occurs regularly some 500 meters from the beginning of the field, it is difficult to land because the time to slow down the aircraft is too short. The approach in the upper wind layer cannot be made slower than 150 kilometers per hour because the stalling speed of the Morane fighter is 145 kilometers per hour.

We also have cases where wind velocity decreases very rapidly near the ground. In these cases, it is exactly as Captain Sheridan says: the airspeed (speed of the aircraft in relation to the surrounding air) decreases and the rate of descent increases. This, however, can be corrected in most cases (as Captain Schwartz says) by progressively applying power.

H. SCHAFROTH-ROSSIER

Bern, Switzerland

. . One morning at Laramie, Wyo., we were especially wind-conscious because a 35 m.p.h. blow kept us on the ground until 11 a m. Then the wind dropped to 15 m.p.h. . . .

I looked at the anemometer and told my student to get in the Luscombe. After another look at the lazily revolving cups, I raised my arm to give him the highball. Then I happened to glance toward the northeast corner of the field.

Another Luscombe was making a normal approach, power off, directly into the 15 m.p.h. southwest breeze. A wall of dust was moving directly at his tail! I grabbed the nearest strut and yelled, "Cut the switch and grab the other wing!" The cups on the weather station were still turning slowly with the arrow pointing southwest when the dust hit the landing airplane from the rear.

My line of sight was almost 90° to the flight path of the victim. I can therefore testify that he came down almost vertically—and *fast!* The drop was about 75 feet. Just before touching the ground the engine roared and the descent seemed to be checked a little, but there was still no appreciable forward movement. The nose came up slightly and the plane hit three-point. . . .

The pilot said he was gliding at 60 m.p.h., which was our usual procedure and conforms to my observation that the approach was normal. Using rule of thumb altitude correction of two per cent per 1,000 feet, his true airspeed may have been 70 m.p.h. Having a 15-mile headwind, his groundspeed would be about 55 m.p.h. Since the mass of air made visible by the dust overtook the plane, it must have been moving more than 55 m.p.h. Thus, Sheridan's hypothetical zero airspeed ceases to be hypothetical.

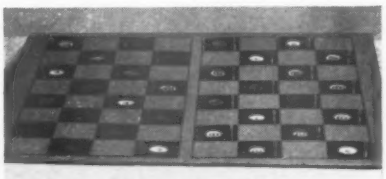
I think that it is significant that the resulting descent was apparently vertical. It indicates that the transition area between the two air masses was extremely small, and that the effect of the tailwind could not overcome the inertia of the plane in the time it took to drop 75 feet. . . .

A. H. KNOUFF

Tucson, Ariz.

BUILT-IN CHECKERS

. . . On trips, both in private planes and airlines, one can become quite bored. After much thought and experiment, I have invented a checker board with the men built in so that the game cannot be spilled—and the men cannot be lost. Also, a partly completed game can be folded up and finished at a later time.



Here's how I did it: I took a regular checkerboard and cut a hole the size of a checker in the center of each black space. Underneath the board, I mounted a series of disks, each containing a red man, a black man, a red king, a black king, and a black spot denoting no checker. Any one of these five pieces can be rotated into view through the hole in the checkerboard by means of a small

axle attached to the cardboard disk under the board.

I have similarly constructed a chess board.

I have applied for a patent on the game, and hope to offer some to the airlines and private flyers soon.

PETER N. SAVESKIE
Staten Island, New York

A MODEL ERROR

In "Midget Flat-top" [August FLYING] you state the model planes are *Wildcats*. They look like *Bearcats*. . . .

ROBERT PARTRIDGE
Norcross, Ga.

The model carrier is not a copy of the *U. S. S. Enterprise* [but] . . . is a scale model of an *Essex* class carrier. . . . As originally built, the model was not to represent any one particular ship but was to honor all ships of the *Essex* class. . . .

JOE CAGLIONE
Naval Air Station,
San Diego, Calif.

• FLYING's editors erred in not examining photograph closely enough. Caption material received from International News Photos was wrong.—Ed.

VAIN BRITISH CLAIMS?

[FLYING recently said that] "a shy, young genius is the father of present day jet aircraft." Of all the vain British claims I have heard thus far, this one takes the cake. . . .

Let's keep the record straight. Sir Frank Whittle's job flew in May of 1941. Historic facts show that on August 27, 1940, [10 months before Whittle's craft flew] a jet plane designed by S. Campini [an Italian engineer] took to the air and was propelled by the reaction of ejected gases.

So Mr. Campini himself conceived the first successfully flown jet plane. [But] let's look back 2,000 years to Hero and his Aeolipile . . . A metal sphere was suspended on its axis over a boiling bowl of water. Two bent tubes, equatorially mounted on a ball, dipped into the boiling liquid. Steam rushed into the ball and out through the bent tubes. These jets of steam caused the ball to whirl around, and we still use the same idea today.

. . . We can be grateful to Hero for starting the ball rolling (or turning, as the case may be) on this idea of jet propulsion.

HENRY A. STOPP
Instructor, CAP
Seattle, Wash.

• No one man developed the jet engine. Reader Stopp rightly points to Hero, who lived at about the beginning of the Christian era, as having tinkered with the idea. Sir Isaac Newton, too, worked on jet propulsion, as did the Italian Giovanni Branca (circa 1629), an Englishman John Barber (1791), two Frenchmen named Lorin (1908) and O. Morize (1917), an Englishman H. S. Harris (1917), two Americans E. N. Jacobs and J. M. Shoemaker (1927) and scores of others. Campini's jet-propelled plane flew 10 months before Whittle's. But the vast majority of our jet developments have nonetheless derived from the "shy young genius" whose gas-turbine jet flew in 1941.—Ed.

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BONANZAS: 20 available. All models. Some painted. Extra tanks. Gyros. ADF. Several excellent "buys." Request detailed descriptions. Powers & George, Aircraft Brokers, 475 5th Ave., New York, N. Y.

WANTED Bonanza. State general condition and best cash price. H. Franz, 1718 N. 1st St., Milwaukee 12, Wis. Phone: Locust 2-1250.

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CRUISAIRS: 12 available. No. 87860F equals 1948 model. 60 hours since engine overhauled, recovered, new leather upholstery, etc. Has gyros, 2 two-way radios, and Aeromatic propeller. Beautiful. $3250. Apply, Powers & George, Aircraft Brokers, 475 5th Ave., New York, N. Y.

CESSNA

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CESSNA 170, Model 148 less 50 hrs. Two-way radio. Perfect condition. Price $4,000. M. D. McReynolds, Idabel, Okla.

CESSNA 140'S: 60 available. 1947, No. 2103NF, has 240 total hours. Metal propeller. Radio. Regloed. Excellent, $1550. Make offer. 1948-49 models slightly higher. Inquire, Powers & George, Aircraft Brokers, 475 5th Ave., New York, N. Y.

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WIDGEON Amphibians: 14 available. 1947, G-44A, No. 8765F, has only 200 total hours. Curtiss metal propellers. Full blind. Special radio. New condition. Grumman maintained. $14,000. Offers considered. Inquire, Powers & George, Aircraft Brokers, 475 5th Ave., New York, N. Y.

NAVION

NAVIONS: 26 available. North American and late Ryan models. Several real bargains. Request detailed descriptions and prices of Powers & George, Aircraft Brokers, 475 5th Ave., New York, N. Y.

REPUBLIC

SEABEES: 38 available. No. 6226KF has 150 total hours. August license. All modifications. No corrosion. Primary blind instruments. Gyro. Loop. Perfect. $2775. Make offer. Apply, Powers & George, Aircraft Brokers, 475 5th Ave., New York, N. Y.

STINSON

STINSONS! Large selection. Request descriptions. 1947 Station Wagon, No. 959DF has 382 total hours. June license. Bargain. $2400. Practically new 1948's from $4175 with extras. Inquire, Powers & George, Aircraft Brokers, 475 5th Ave., New York, N. Y.

STINSON 1947, 150 H.P. 265 hrs., total. Radio, Pants, Lights, Blind flight group, relicensed, clean, $2850.00. Trade down, or for Bellanca equal condition. Edwin Bruzas, Hilltown, Pa.

1948 STATION Wagon on Floats: 205 total hours. Factory corrosion proofed. All bulletins. May license. Metal propeller. Gyros. Wheels. Asking $7100. Outstanding condition. Apply, Powers & George, Aircraft Brokers, 475 5th Ave., New York, N. Y.

SWIFT

1946 SWIFT 125. Globe Deluxe with 210 hours, primary blind instruments, radio, Aeromatic propeller, $2300. Edwin Vogel, Lohrville, Ia.

GLOBE Swift Deluxe. One owner, always hangared. Loop, Chest Straps, Stall Warning Indicator, and other extras. Price $2200. Will consider automotive trade. Clement Pease, 125 Middlebeach Rd., Madison, Conn.

SWIFT 125'S: 20 available. Metal hatched Globe Deluxe has 132 total hours, $1900. 1948 Temco Deluxe has 102 hours. Extra tank, $3100. 1949 Temco Deluxe has 42 hours, $3995. All excellent. Make offers. Inquire, Powers & George, Aircraft Brokers, 475 5th Ave., New York, N. Y.

MISCELLANEOUS

SCHWEIZER Sailplane TG3-A. Licensed, low time, refinished, new glass. Trailer, ropes. $575. Wm. Boelter, Barry Field, Saginaw, Mich.

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1949 PIPER Clipper, fully equipped; 1946 Super Cruiser, 1946 Cub's, 1946 Aeroncas, Cub Coupe. For more information call Donora 43-J, George Buck, Webster, Pa.

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POWERS & George, Aircraft Brokers, 475 Fifth Avenue, New York, N. Y., have purchasers for all types of aircraft. No charge for listing your ship for sale. Write for details, describing your airplane.

1949 CESSNA 170. Trade 1948 Cessna 140 and cash. Victor Merrihew, Ashby, Nebr.

AVIATION EQUIPMENT

ASTRO compasses (New surplus) $12.50; Model "G" New Computer $7.50; Fairchild (surplus) Sextant $12.50; New Taylor Barometer (Brass) $18.00; New D-12 Magnetic Compass, $150.00 value, only $12.95; New improved E-6B Computer $10.00; Weems Navigation Plotter $2.00; AAF-type A-2 Computer $2.00; American Airlines Computer $5.00; Weems Second Setting wrist watch $43.75; (Free Catalog). Pan-American Navigation Service, 12021-8 Ventura Blvd., N. Hollywood, Calif.

BATTERIES & Tires, brand new, for all types Aircraft. Send for free list. Flying Equipment Co., 1641-5 W. Wolfram St., Dept. F, Chicago 13, Ill.

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BUY Factory direct and save! A-2 AAF Regulation Type Flight Jackets. Finest front quarter Horsehide. Sizes 34-46 only $17.75. Larger sizes add $1.00. A-2's with Mouton Fur Collar 34-46, now $18.75. All Rayon lined. K-1 Flying Suits $9.95. B-15 Type Flight Jackets $9.95. 20% discount allowed on any six garments ordered. Money back guarantee. C.O.D. Check or money order. Write for free catalogue and price list. (Name engraved in gold on leather with wings 75c cash or M.O. only.) R.A.F. Mfg. Co., 6 E. Lake St., Chicago 1. Ill.

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AAF TYPE Sunglasses, new $1.50 ea. Heavy 24 Karat Gold Plated Frames. Precision lens, carrying case. Lifetime service guarantee! Display card if desired. Send check, money order or C.O.D. Money back guarantee. 20% discount lots of 6 pair or more. R.A.F. Mfg. Co., 6 E. Lake St., Chicago 1, Ill.

RAY-Ban Sun Glasses, original, by Bausch & Lomb, gold filled frames, Ladies or Gents, $7.95; Gents with sweatbar $10.95. Shooting Glasses $13.00 pr.; Pilot License Cases-P1 genuine Morocco leather, six windows, $2.50; P2 sheepskin leather, $1.25; add 20% excise tax to license case prices. B3A AAF summer Flying Gloves, genuine dark brown unlined kidskin leather all sizes $2.95; Buckskin $3.95; Aircraft Inspection Flashlight, long adjustable nozzle $1.25; Tie Down Kit, D1, complete in zippered case, lifetime kit $8.00 Headsets $3.50; Safety Belts, Khaki $1.50; E6B Metal Computers, $6.75; Computer Manual, $2.50; Goggles by Fischer, various types. Microphones, various types. Complete line of Eastman Cameras, Bausch & Lomb Binoculars, film, both still and movie. Send for free list. Flying Equipment Co., 1641-5 W. Wolfram St., Dept. F., Chicago 13, Ill.

MOTOR Scooter Tires; new, 4.00x8, 4 ply Hex tread $7.50; 6.00x6 2 ply Mud & Snow $9.90; 6.00x6 2 ply rib $9.50; 6.00x6 4 ply rib $9.75; 6.00x6 4 ply Mud & Snow $10.00. Flying Equipment Co., 1641-5 W. Wolfram St., Dept. F., Chicago 13, Ill.

HALLICRAFTER Skyfone Transceiver, Model CA-4, Wt. 7 lbs, 14 oz. Brand new. 12 Volt. A bargain at $50.00 each f.o.b. Chicago. Antenna mast and loading coil $4.50 each. State antenna length. Flying Equipment Co., 1641-5 W. Wolfram St., Dept. F, Chicago 13, Ill.

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GUARANTEED: Ross Guaranteed Questionnaires are available for all C.A.A. ratings. They carry a full money back guarantee if you fail to pass your exams. Ross Questionnaires have been used by thousands of Pilots, Mechanics and Instructors with success. The frequent revisions insure your obtaining the very latest material. With a Ross Guaranteed Questionnaire you save time, effort, and money. Order direct or from your nearest Dealer. "Engine Mechanic $3.00"; "Aircraft Mechanic $3.00"; Both for $5.00; "Commercial Pilot $4.00"; "Flight Instructor $4.00"; "Instrument Rating $4.00"; "Meteorology Instructor $2.50"; "Navigation Instructor $2.50"; "Aircraft Instructor $2.50"; "Engine Instructor $2.50"; "C.A.R. Instructor $2.50"; "Fundamentals of Instruction $1.00"; "As a Special offer the complete set of the above Questionnaires are priced at only $15.00". Ross Guaranteed Questionnaires are the only books available that include the same Navigation and/or Weather maps that are used by C.A.A. on their exams. Free Folder on request. Orders sent Postpaid or C.O.D. Ross Aero Publishers, Dept. 1-F, Administration Bldg., Commercial Airport, Tulsa, Okla.

FREE! How to fly cross-country safely, how to land at airports, told in free booklet, "Happy Landings," sent to Pilots and Students. Hangar Flying, Dept. 1J10, 112 E. Grove, Bloomington, Ill. Clip this.

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PATENTS

INVENTORS. When you are satisfied that you have invented something of value, write me, without obligation, for information as to what steps you should take to secure a Patent. Write Patrick D. Beavers (formerly Randolph & Beavers), Registered Patent Attorney, 912 Columbian Bldg., Washington 1, D. C.

INVENTORS. Without obligation, write for information explaining the steps you should take to secure a Patent on your invention. John N. Randolph, Registered Patent Attorney, 218 Columbian Bldg., Washington 1, D. C.

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FOR Sale: Completely equipped flight operation. Three locations in northwest area. Profitable going businesses in air minded communities. Sale includes aircraft, shop equipment, parts and materials. Investigation will reveal excellent present and future profit opportunities. Box 638, c/o FLYING.

PROFITABLE Opportunities in small aviation business. Confidential survey describes 47 opportunities to start your own business in aviation: 21 ways to make money with a light plane! 16 on-the-ground "shoestring" opportunities (capital $100 up)! 10 opportunities requiring moderate capital ($1,000 up)! Includes spare-time and mail-order businesses, $2.00. Christopher Publications, Dept. CP-10, Holtsville, N. Y.

MISCELLANEOUS

AIRCRAFT photographs. Sample photo and illustrated 52-page catalogue listing nearly 5000 aircraft from World War I and II. 25c. Aeroplane Photo Supply, Box 195, Toronto, Canada

LEATHER Name Patches gold stamped, with Military or Civilian wings. $1.00. 3 for $2.00. Clubs, Schools, any design. Julie's Leathercraft, Lone Tree, Iowa.

WANTED someone to help develop Intermittent Jet Motor for light Aircraft high thrust force with low fuel consumption, complete details with photoprints sent to parties sincerely interested. Thomas McDowell, Stillwater, Nev.

MEN! Large size shoes, large size sox! We specialize in large sizes 10 to 16, widths AAA-EEE. Dress, sport, work shoes. Guaranteed. Write for free catalog. King-Size, Inc., 185, Brockton, Mass.

FLY for $4 per hour or less. Join a Non-Commercial Flying Club in N. Y. C. Call Circle 6-9795 between 7-9 P. M.

FIRST Atomic War Collection. Big opportunity for collector's. All campaign ribbons and divisional patches of American fighting forces. Reasonably priced. Big package, 15 ribbons, 30 patches, $1.00. Postage and handling 10c. Merchandise Distributing Co., 19 E. 16th St., New York 3, N.Y., Dept. FM-1.

LEATHER Jackets renovated, cleaned, dyed, repaired, relined, expertly, reasonably. Send for itemized price list No. 2. Berlew Mfg. Co., Freeport, N.Y.

WATCH Repairing by Factory trained men. Write for price list. E. Sokolec, 7715 South Shore Drive, Chicago 49, Ill.

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50%-95% BELOW COST!

CAMERAS & WATCHES

Fairchild F-8 Aerial Camera (left), with Wollensak f5.6, 15" lens, shutter speeds to 400th of second. Hand-operated. Uses 24' film roll. Comes brand new, in carrying case. Originally $800.00.....Now **$175.00**

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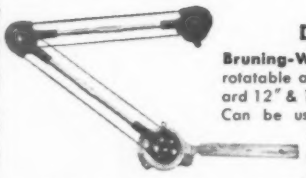
Hamilton Master Watch, 22 jewels, 24-hour dial. With carrying case. Now, new, **$67.50**



DRAFTING SUPPLIES

Bruning-Wallace Protractor (left) with single rotatable arm, reading in degrees only. Standard 12" & 18" scales. Table anchors & oak case. Can be used for some drafting jobs. Was $65.00.....Now, new, **$37.50**

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Bruning Metal Scales, for Detail Drafter, priced from.....**$2.85**

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Pioneer Panel Compass, for planes, boats & autos. Precision test-proved. Diam.: 3⅛". Mounting directions.....Now, new, **$17.50**

SEXTANTS

Fairchild A-10-A (right), automatic electric averager, adjustable bubble, night lights. Was $325.00.....Now, good condition, **$17.50**

Fairchild A-10, Air Force model with manual averager, night lights & carrying case. Was $300.00.....Now, good condition, **$12.50**

Link A-12, simplest, most compact bubble sextant in use. Case & all accessories. Was $230.00. Now, factory-new, **$37.50**

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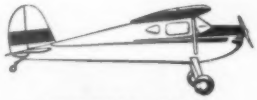

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A roomy, 2-place, cross-country plane at light training plane price! Choice of 85 or 90 H. P. engine. Cruise at over 105 or 110 m. p. h.

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Luxurious, 4-5 place personal or company airliners. Yet surprisingly economical to own and operate. Cruise at over 165 m. p. h.

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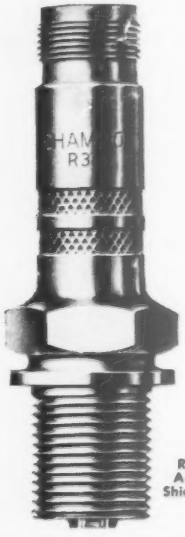

R 37 S—1
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Shielded Type

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CAPITAL AIRLINES (P.C.A.)
CHICAGO & SOUTHERN AIRLINES, INC.
COLONIAL AIRLINES, INC.
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C26—
Unshielded
Actual Size 2⅜"

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